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ABSTRACT

The second year of a state supported early childhood education program was evaluated, using a pre-post evaluation design involving experimental and control groups. An Early Childhood Assessment Battery was administered to 720 five-year-olds enrolled in the kindergarten program by their teachers. The control group (178) were tested locally. Results include: (1) The steadiness of the trends in non-cognitive areas from the beginning to the end of the year, and from one year to the next, gives confidence that the Classroom Behavior Inventory is a means for measuring non-cognitive aspects of children's school experiences; (2) Helping increase children's behavior in the areas of the positive behavior traits--and decrease the negative--has a positive effect upon cognitive performances; (3) In cognitive changes, the experimental group exceeded the control group in absolute scores on every test; (4) All children who attended kindergarten the year before are maintaining a reasonable average with respect to national norms; and (5) The children who had attended kindergarten the year before continued to make substantial gains between the beginning and ending of first grade on all measures. (Author/CK)

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NORTH CAROLINA STATE SUPPORTED

EARLY CHILDHOOD DEMONSTRATION CENTERS

SECOND ANNUAL EVALUATION

1970-1971

PS 005498

The Learning Institute of North Carolina
Research and Evaluation Team
1006 Lamond Avenue
Durham, North Carolina 27701

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CHAPTER I

INTRODUCTION

The major findings of the evaluation of the second year of North Carolina's programs for the development of early childhood education are presented in this report.

Nineteen seventy through 1971 represented the second year of state supported kindergarten programs in North Carolina's public schools. In 1969-70, 320 children had been the first five-year olds to attend kindergarten supported directly through state funds. There were 40 children in each of eight schools across the state, and each operated as the heart of an early childhood demonstration center.

All of these schools were charged to develop programs of excellence for five-through eight-year-old children, along with teacher training and parent involvement opportunities, and cooperative arrangements with other agencies; these programs were to be evaluated and disseminated. Ten schools were added to these original eight during 1970-71. Intensive summer training -- in which primary teachers, principals, special education personnel and other school administrators joined the teachers and assistant teachers of the five-year-old children -- was provided before the second year began. The program has by now, at the end of 1971, expanded to include Early Childhood Staff Development Centers to provide year-round training and support services. There is one such center in each of the eight educational districts, each attached to one of the demonstration centers.

One of the features which has distinguished this statewide plan for establishing kindergartens and developing new kinds of teaching styles and classroom organization through the primary grades was the combined program of child assessment and program evaluation. The responsibility for carrying out this combined program was given to the Learning Institute of North Carolina.

At the end of its report* of the evaluation of the first year of operation, LINC summarized the nature of the study, the results from the study of 1969-70 five-year-old children, and the conclusions reached to that point. That report should be referred to as prerequisite for the results to be documented in this report of the second year of the program's operation.

For the first year, the summary explains:

> A pre-post test evaluation design was adopted using experimental and control groups drawn randomly from applications to the eight demonstration centers. There were 317 children in the Experimental group and 52 in the Control group. The Experimental group was given pre- and post-testing; the Control, only post-tests. We hoped that the results would show that kindergarten experience was better for children than the absence thereof. Our evaluation was political to the degree that we wished the results to show North Carolina legislators that the allocation of the first million dollars of state supported kindergarten resulted in children being better prepared to enter regular school.
>
> In addition, it was the desire of the State Department of Public Instruction and the Learning Institute of North Carolina to use the opening and developing of the kindergarten to improve the quality of education for children through the entire primary (K-3) range. Many of the eighteen centers operating now (1970-71) are trying out new approaches and new classroom organization to provide a rich and open

*North Carolina State Supported Early Childhood Demonstration Centers, First Annual Evaluation, 1969-70, Durham, North Carolina, The Learning Institute of North Carolina, 1970 (Mimeograph).

environment for young children's development. The changes have already reached the children through eight years old and in fact several of the centers are planning now to extend to upper elementary grades.

Our study demonstrated, first, that children made significant gains during the 5-month period of attendance at kindergarten, and also that most of their performances at the end-of-school testing were significantly higher than the equivalent group of children who did not attend kindergarten.

1. The experimental group (N=317) moved from approximately the 35th to the 65th percentile on the TOBE test of knowledge in the four areas of language, mathematics, social studies and science. Stated another way, at the beginning of kindergarten two-thirds of the national sample scored better on the TOBE tests than the experimental group's average. At the end of the program the experimental group's average was in the top one-third of the national sample's scores.

2. The control group (N=52) average in May, 1970, equalled approximately that of the experimental group in December, 1969, on all forms of TOBE tests.

3. On the Draw-A-Man test, using the Vane Scoring Scale,* the experimental group's average mental age increased two months for each one month enrolled in the program (M.A. of 5-1 in December to 5-11 in May).

4. On the same test in May the control group showed an average mental age of 5 years, 8 months.

5. On the Preschool Inventory, the experimental group improved from a mean score of 46 in December, 1969, to a score of 57 points in May, 1970.

6. On the Preschool Inventory the control group's average for May was 48 raw score points, not significantly different from the experimental group's average in December, 1969, but significantly lower than the May average.

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*Julia Vane, "The Vane Kindergarten Test," Journal of Clinical Psychology Monograph Series #2, 1968.

> The second year of the kindergarten evaluation is presently underway. We are employing approximately the same evaluation design with the addition of a fall testing of the control group so that there will be before-and-after measures for both groups. For 1970-71 there are approximately 720 experimental subjects and 275 in the control group. These control subjects are individually tested by trained personnel employed by LINC. We have a full nine months of treatment and somewhat better control groups.

The report ended by affirming that as the program of early childhood education increased both in quantity and quality throughout the state, LINC would evaluate the progress of each new group of entering five-year-old children, as well as keep up with the first year's groups as they became six- and seven-year olds and, hopefully, even further up into their school careers. The report ends: "Thus, the monitoring of the early childhood program will continue, so that this innovative program can remain accountable to those who are supporting it and observing its progress."

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CHAPTER II

RESULTS OF ASSESSMENT IN NON-COGNITIVE AREAS

Since the opening of the North Carolina State Supported Kindergarten Program, there has been great interest in the effect that kindergarten has had on non-cognitive measures or measures in the affective domain. From the outset of the kindergarten evaluation these measures have been a part of the overall design. Specifically, the Classroom Behavior Inventory (CBI) by Schaefer and Aaronson was selected as the affective measure. A sixty-item inventory was selected with the assistance of Dr. Schaefer. The entire inventory is presented at the close of the chapter with an analysis of various items and the scoring system.

After two years of pre and post administration and analysis of the CBI, the LINC Research and Evaluation Team is presenting the results of our measures in the affective domain. Obviously, since the affective measure chosen dealt specifically with classroom observations, there were no control groups involved in the study. Therefore, we present pre and post measures on kindergarten participants only.

The Classroom Behavior Inventory investigates twelve non-cognitive areas by using a four-point scale from very frequently to very infrequently (see Inventory form). The twelve subscales are:

1. Verbal Expressiveness
2. Hyperactivity
3. Kindness (passive helpfulness)
4. Social Withdrawal

5. Perseverance
6. Irritability
7. Gregariousness
8. Distractability
9. Considerateness
10. Self-Consciousness
11. Concentration
12. Resentfulness

Each subscale is derived by using five items which monitor behavior that relates logically to that specific subscale.

Tables I, II and III are the results of the 1970-71 study of the CBI on the approximately 720 five-year olds enrolled in the kindergarten program. After computing the means, standard deviations and variance for each subscale on pre and post administrations of the CBI, t tests for the significance of difference on correlated samples were computed. Nine of the twelve t tests were significant. On those subscales that are most related to kindergarten programs and success in school (verbal expression, considerateness, gregariousness, perseverance, kindness and concentration), students showed the most positive change. On those subscales for which negative change was desirable (social withdrawal and distractibility), the changes were significant and in the desired (negative) direction.

For students in the 1970-71 North Carolina State Supported Early Childhood Development Centers it is concluded that this experience did change, significantly in many cases, the affective behavior of children as seen by their teachers. In fact, kindergarten experiences have as much or more effect on the non-cognitive

TABLE I

ANALYSIS I

GROUP 0 = 715 STATE KINDERGARTEN PROGRAM 1970-71 MEAN AND S.D. FOR CLASS BEHAVIOR INV(PRE)

MEANS AND STANDARD DEVIATIONS

VARIABLE	N	MEAN	STANDARD DEVIATION	VARIANCE	SUM X**2	SUM X
VERBX	712	12.533707	4.541911	20.628960	126518.000000	8924.000000
HYACT	713	10.963534	3.727564	13.894745	85545.000000	7817.000000
KIND	713	10.692847	2.977852	8.867603	87836.000000	7624.000000
SOCWD	713	8.402524	3.192220	10.190274	57595.000000	5991.000000
PERS	713	11.095371	3.193109	10.195347	85035.000000	7911.000000
IRRIT	713	7.455820	3.489321	12.175362	48304.000000	5316.000000
GREG	713	12.848527	4.059536	16.479832	129439.000000	9161.000000
DISTR	713	10.793828	3.467483	12.023445	81547.000000	7696.000000
CONSD	713	11.112201	3.096074	9.585707	94857.000000	7923.000000
SELFC	713	9.026647	3.721802	13.851815	67454.000000	6436.000000
CONCN	713	10.747544	3.947834	15.588121	83737.000000	7663.000000
RSENT	711	6.864978	4.243353	18.022588	40979.000000	4881.000000

ANALYSIS I

GROUP 0 = 680 STATE KINDERGARTEN PROGRAM 1970-71 MEAN AND S.D. FOR CLASS BEHAVIOR INV(POST)

MEANS AND STANDARD DEVIATIONS

VARIABLE	N	MEAN	STANDARD DEVIATION	VARIANCE	SUM X**2	SUM X
VERBX	672	15.172619	4.095356	16.771946	165954.000000	10196.000000
HYACT	673	10.503714	3.337699	11.140239	81737.000000	7069.000000
KIND	673	12.983655	3.081922	9.498244	119834.000000	8738.000000
SOCWD	673	7.769687	2.711116	7.350151	45567.000000	5229.000000
PERS	673	13.081723	3.417502	11.679323	123020.000000	8804.000000
IRRIT	673	7.526002	3.392436	11.508623	45853.000000	5065.000000
GREG	673	14.791976	3.635325	13.215590	156135.000000	9955.000000
DISTR	673	10.041604	3.494646	12.212554	76068.000000	6758.000000
CONSD	673	13.213967	3.210193	10.305340	124437.000000	8893.000000
SELFC	673	8.575037	3.466918	12.012559	57559.000000	5771.000000
CONCN	673	12.197221	2.875494	8.268467	105516.000000	8202.000000
RSENT	673	6.869242	2.992175	8.953115	37773.000000	4623.000000

TABLE III

$\underline{t}$ TEST FOR SIGNIFICANCE OF DIFFERENCE FOR CORRELATED SAMPLES

Pre-Post Scores on the Classroom Behavior Inventory
Twelve Subscales: N=715

Subscale	$\bar{X}_1 - \bar{X}_2$	$\underline{t}$	Level of Significance
1. Verbal Expressiveness	2.64	10.56	.001
2. Hyperactivity	-0.46	2.30	N.S.
3. Kindness	2.29	11.45	.001
4. Social Withdrawal	-0.63	3.50	.001
5. Perseverance	1.98	9.90	.001
6. Irritability	0.07	0.35	N.S.
7. Gregariousness	1.94	8.44	.001
8. Distractability	-0.75	3.75	.01
9. Considerateness	2.10	10.50	.001
10. Self-Consciousness	-0.45	2.25	.05
11. Concentration	1.44	6.26	.01
12. Resentfulness	0.01	0.05	N.S.

aspects of child behavior as on the cognitive.

Tables IV, V and VI present similar data for the approximate 275 six-year-old children who had attended during the previous year the North Carolina State Supported Early Childhood Education Centers. Results of the study of these children show similar findings. First, in those subscales logically related to school success the children showed significant positive gains. The t tests on verbal expressiveness, kindness, perseverance, gregariousness, considerateness and concentration all were significant. Further, on those subscales for which negative change was desirable, there were desirable results.

All too little emphasis has been placed on the importance of kindergarten experience to those characteristics of child behavior that may be identified as affective or non-cognitive. Although these measures are more difficult to quantify and measurement techniques have not reached the level of sophistication as have the cognitive measures, they are and have been important to the kindergarten evaluation in North Carolina.

Results of the LINC evaluation over two years of study show that kindergarten experiences do make positive and significant differences in the non-cognitive behavior of five-year-old children and that these changes do not wash out -- in other words, children continue to make these changes after entering grade one.

As a part of our analysis of the non-cognitive measure, we computed a correlation matrix between all subscales on the CBI and our cognitive measures for both pre and post data for all kindergarten children. These are presented in Tables VII and VIII. These matrices allow the study of the Pearson Product Moment of

TABLE IV

ANALYSIS 1

GROUP 0 = 276 STATE 6 YEAR-OLD PROGRAM 1970-71 MEAN AND S.D. FOR CLASS BEHAVIOR INV(PRE)

MEANS AND STANDARD DEVIATIONS

VARIABLE	N	MEAN	STANDARD DEVIATION	VARIANCE	SUM X**2	SUM X
VERBX	267	13.550561	4.141331	17.150629	53588.000000	3618.000000
HYACT	267	10.584269	3.66 [illegible]	13.446819	33488.000000	2826.[illegible]
KIND	267	11.861423	3.034806	9.210047	40015.000000	3167.000000
SOCWD	267	8.086142	2.504396	6.274506	19127.000000	2159.000000
PERS	267	12.352059	3.843218	14.770324	44666.000000	3298.000000
IRRIT	267	7.745318	3.424086	11.724367	19136.000000	2068.000000
GREG	267	13.606741	3.551822	12.615443	52789.000000	3633.000000
DISTR	267	10.479400	3.576572	12.791867	32724.000000	2798.000000
CONSD	267	12.157303	3.267171	10.674410	42302.000000	3246.000000
SELFC	267	9.363295	3.303996	10.916392	26312.000000	2500.000000
CONCN	267	11.595505	3.279186	10.753062	38760.000000	[illegible]
RSENT	266	7.180451	3.180420	10.118257	16396.000000	191 .000000

TABLE V

ANALYSIS I

GROUP 0 = 254 STATE 6 YEAR-OLD PROGRAM 197 -71 MEAN AND S.D. FOR CLASS BEHAVIOR INV(POST)

MEANS AND STANDARD DEVIATIONS

VARIABLE	N	MEAN	STANDARD DEVIATION	VARIANCE	SUM X**2	SUM X
VERBX	248	15.161290	3.897236	15.188455	60758.000000	3760.000000
HYACT	248	10.907258	3.369827	11.355736	32309.000000	2705.000000
KIND	248	13.209677	3.029608	9.178529	45542.000000	3276.000000
SOCWD	248	7.737903	2.434538	5.926978	16313.000000	1919.000000
PERS	248	13.116935	3.666021	13.439712	45989.000000	3253.000000
IRRIT	248	7.939516	3.333119	11.109687	18377.000000	1969.000000
GREG	248	14.762096	3.504169	12.279205	57077.000000	3661.000000
DISTR	248	13.241935	3.655999	13.366331	29316.000000	3284.000000
CONSD	248	13.173387	3.389400	11.488033	45875.000000	3267.000000
SELFC	248	9.032258	3.346242	11.197335	22998.000000	2240.000000
CONCN	248	12.512096	3.494335	12.210379	41841.000000	3103.000000
RSENT	248	7.350806	3.084819	9.516112	15751.000000	1823.000000

TABLE VI

t TEST FOR SIGNIFICANCE OF DIFFERENCE FOR CORRELATED SAMPLES

Pre-Post Scores for Five-Year Olds in North Carolina State Kindergarten Program, 1969-70
Twelve Subscales: N=276

Subscale	$\bar{X}_1 - \bar{X}_2$	t	Level of Significance
1. Verbal Expressiveness	1.61	4.24	.01
2. Hyperactivity	0.32	1.00	N.S.
3. Kindness	1.35	4.66	.001
4. Social Withdrawal	-0.35	1.75	N.S.
5. Perseverance	0.76	2.18	.05
6. Irritability	0.24	0.75	N.S.
7. Gregariousness	1.15	3.60	.01
8. Distractibility	-0.24	0.75	N.S.
9. Considerateness	1.01	3.37	.01
10. Self-Consciousness	-0.34	1.13	N.S.
11. Concentration	0.95	3.17	.01
12. Resentfulness	0.17	0.61	N.S.

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TABLE VII

ANALYSIS I

GROUP D = 505 LINC,KINDERGARTEN 1970-1971,CORRELATION
PRE-TESTS

TSAR FORTRAN PROCEDURE RECORR FOR VARIABLES PSR , PPV , DM , HIS , L , M , VERB , HYPER, KIND , SWITH, PERSV, IRR
GREG , DISTR, CONSD, SCON , CONCN, RESNT

	PPV	DM	HIS	L	M	VERB	HYPER	KIND	SWITH	PERSV	IRR	GREG	DISTR	CONSD	SCON	CONCN	RESNT
PS	474	535	494	678	726	473	-171	326	-345	407	-087	411	-313	259	-400	132	-066
N	690	695	670	689	689	687	687	687	687	687	687	687	687	687	687	687	685
PPV		452	528	629	667	463	-130	349	-263	337	-056	350	-282	212	-366	107	-048
N		696	72	692	692	690	690	690	690	690	690	690	690	690	690	690	688
DM			447	527	491	303	-156	194	-202	347	-039	243	-277	191	-262	193	-030
N			467	686	686	684	684	684	684	684	684	684	684	684	684	684	682
HIS				461	471	363	-105	249	-218	286	-032	285	-217	168	-254	100	-025
N				672	672	670	671	671	671	671	671	671	671	671	671	671	669
L					731	393	-216	285	-256	394	-073	31	-324	305	-326	150	-062
N					693	691	691	691	691	691	691	691	691	691	691	691	689
M						399	-209	308	-226	390	-109	326	-336	304	-328	141	-103
N						691	691	691	691	691	691	691	691	691	691	691	689
VERB							194	616	-555	379	142	793	-071	131	-635	156	104
N							691	691	691	691	691	691	691	691	691	691	689
HYPER								-021	-025	-408	437	199	726	-428	047	-242	366
N								692	692	692	692	692	692	692	692	692	690
KIND									-405	417	-188	640	-165	447	-320	189	-212
N									692	692	692	692	692	692	692	692	690
SWIT										-215	126	-688	157	-005	634	-006	168
N										692	692	692	692	692	692	692	690
PERSV											-149	374	-582	511	-299	494	-121
N											692	692	692	692	692	692	690
IRR												-031	312	-433	017	-187	864
N												692	692	692	692	692	690
GREG													-012	173	-581	150	-068
N													692	692	692	692	690
DISTR														-396	265	-322	261
N														692	692	692	690
CONSD															-010	323	-390
N															692	692	690
SCON																-059	079
N																692	690
CONCN																	-083
N																	690

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TABLE VIII

ANALYSIS I

GROUP 0 = 684 LINC,KINDERGARTEN 1970-1971,CORRELATION

POST-TESTS

TSAR FORTRAN PROCEDURE TFCORR FOR VARIABLES PPV , DM , L , M , VERB , HYPER, KIND , SWITH, PERSV, IRR , GREG , DISTR, CONSD, SCON , CONCN, RESNT

	DM	L	M	VERB	HYPER	KIND	SWITH	PERSV	IRR	GREG	DISTR	CONSD	SCON	CONCN	RESNT
PPV	254	611	615	295	-132	170	-159	210	020	202	-180	135	-171	140	-002
N	672	677	674	672	672	672	672	672	672	672	672	672	672	672	672
DM		332	283	216	-264	192	-135	337	-134	188	-324	172	-217	323	-101
N		671	669	666	666	666	666	666	666	666	666	666	666	666	666
L			743	300	-147	196	-147	292	-034	218	-252	148	-219	214	-052
N			675	671	672	672	672	672	672	672	672	672	672	672	672
M				255	-154	189	-124	317	-009	182	-261	166	-205	232	-025
N				669	669	669	669	669	669	669	669	669	669	669	669
VERB					011	594	-454	345	021	756	-158	183	-649	295	-021
N					675	675	675	675	675	675	675	675	675	675	675
HYPER						-179	116	-448	455	024	682	-441	156	-414	401
N						676	676	676	676	676	676	676	676	676	676
KIND							-404	420	-356	644	-721	528	-408	389	-376
N							676	676	676	676	676	676	676	676	676
SWITH								-130	284	-562	221	-105	543	-053	324
N								676	676	676	676	676	676	676	676
PERSV									-267	379	-577	487	-316	786	-290
N									676	676	676	676	676	676	676
IRR										-187	417	-490	141	-234	860
N										676	676	676	676	676	676
GREG											-164	286	-567	319	-205
N											676	676	676	676	676
DISTR												-380	346	-502	371
N												676	676	676	676
CONSD													-120	499	-440
N													676	676	676
SCON														-230	174
N														676	676
CONCN															-256
N															676

Correlation for all subscales of all measures used.

The numbers of children on which these are based are 695 and 684, respectively. With an N of this size, an r of only .115 is significant at the .01 level of confidence. It is evident that most of the correlations are significant, and the question of interest becomes whether a relationship between any two variables is justified.

In our analyses, each of the twelve behavior traits has been correlated with, on the one hand, Home Information Scale score (for educational advantages in the home environment) and the following measures of child performance: Caldwell Preschool Inventory, on pre-test only; and, for pre- and post-test, the Peabody Picture Vocabulary, Draw-A-Man (as scored by the Julia Vane Kindergarten Test system), TOBE Language (K level) and TOBE Math (K level).

One concern that may be studied by these data is the relationship between home background and the behavior traits. Since the Home Information Scale is administered only in the fall, we are examining this relationship only at the early part of the year. The correlations are presented graphically in Table IX.

Correlations between the traits making up the first factor (Introversion-Extroversion) and the score for home factors are uniformly high. Verbal expressiveness has the highest of all the correlations with the Home Information score, and self-consciousness has the greatest negative relationship. Both Social Behavior and Task Orientation are correlated much less strongly with home factors. Kindness and considerateness, the two positive traits of Social Behavior, are correlated with

TABLE IX

CORRELATIONS BETWEEN EACH OF THE
BEHAVIOR TRAITS (GROUPED BY FACTORS) AND HOME INFORMATION SCALE

INTRO-EXTROVERSION

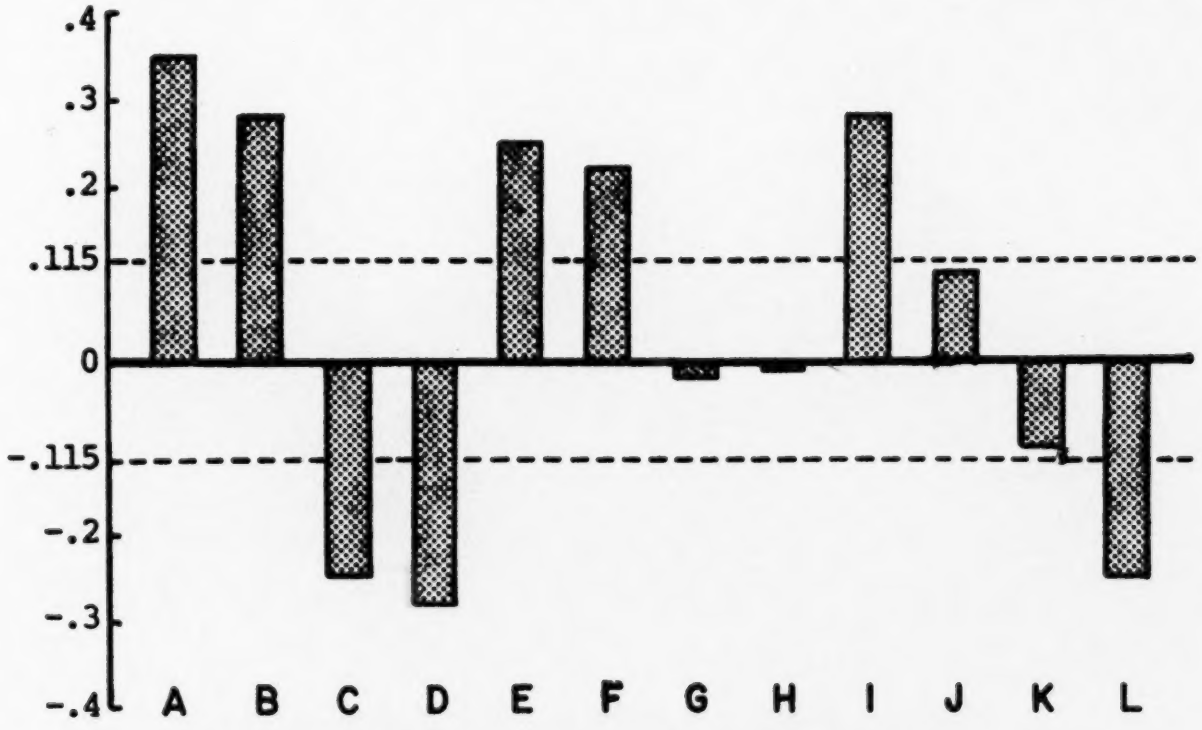
- A - Verbal Expressiveness
- B - Gregariousness
- C - Social Withdrawal
- D - Self-Consciousness

SOCIAL BEHAVIOR

- E - Kindness
- F - Considerateness
- G - Irritability
- H - Resentfulness

TASK ORIENTATION

- I - Perseverance
- J - Concentration
- K - Hyperactivity
- L - Distractability



r's close to .20, but irritability and resentfulness, the two negative traits, show almost no correlation. Home factors are related fairly strongly to the positive Task Orientation trait of perseverance, and to the negative trait of distractability, but only weakly to concentration and hyperactivity.

Children entering kindergarten from home environments with more advantages have more of the positive and less of the negative behavior related to Introversion-Extroversion. Examining Social Behavior it may be observed that children from more advantageous home environments have more of the positive traits but home environment is not at all related to the negative traits. For Task Orientation, more advantageous home environment positively correlates with perseverance -- but correlates more weakly with concentration -- and while it does correlate less with distractability, the relation to hyperactivity is not so strong.

The material depicted in Tables X through XIV addresses to the question:

> What relationship exist between classroom behavior and measures of performance on cognitive tasks?

The performance test calling for the greatest diversity of behaviors from the five-year-old children is the Preschool Inventory. One part of the Inventory is composed of items called "Personality/Social," the second part consists of conceptual knowledge including some quantitative items, and the third is a mixture of sensory and perceptual-motor items. This inventory was given

only at the time of the child's entrance into kindergarten. (In 1969-70, it was used at the time of retesting as well.)

Correlations were very high between the Preschool Inventory and all four of the behavior traits making up Introversion-Extroversion:

POSITIVE: .47 for Verbal Expressiveness; and .41 for Gregariousness

NEGATIVE: -.35 for Social Withdrawal; and -.40 for Self-Consciousness.

For the Social Behavior traits, the positive traits are substantial, while the negative are close to zero:

POSITIVE: .33 for Kindness; and .26 for Considerateness

NEGATIVE: -.09 for Irritability; and -.07 for Resentfulness.

For Task Orientation, perseverance is the one trait highly correlated with the Preschool Inventory; distractability is fairly substantially correlated in the negative direction; and the other two are much more weakly related:

POSITIVE: .41 for Perseverance; and .13 for Concentration

NEGATIVE: -.17 for Hyperactivity; and -.31 for Distractability.

Table X presents in graphic form these correlations with the scores on the Preschool Inventory.

Correlations are available for both pre- and post-tests between each of the behavior traits and the following measures: Peabody Picture Vocabulary (a test of receptive language skill), Draw-A-Man (a perceptual-motor development task), and TOBE Language

TABLE X

CORRELATIONS BETWEEN EACH OF THE
BEHAVIOR TRAITS (GROUPED BY FACTORS) AND PRESCHOOL INVENTORY SCORE

INTRO-EXTROVERSION

A - Verbal Expressiveness

B - Gregariousness

C - Social Withdrawal

D - Self-Consciousness

SOCIAL BEHAVIOR

E - Kindness

F - Considerateness

G - Irritability

H - Resentfulness

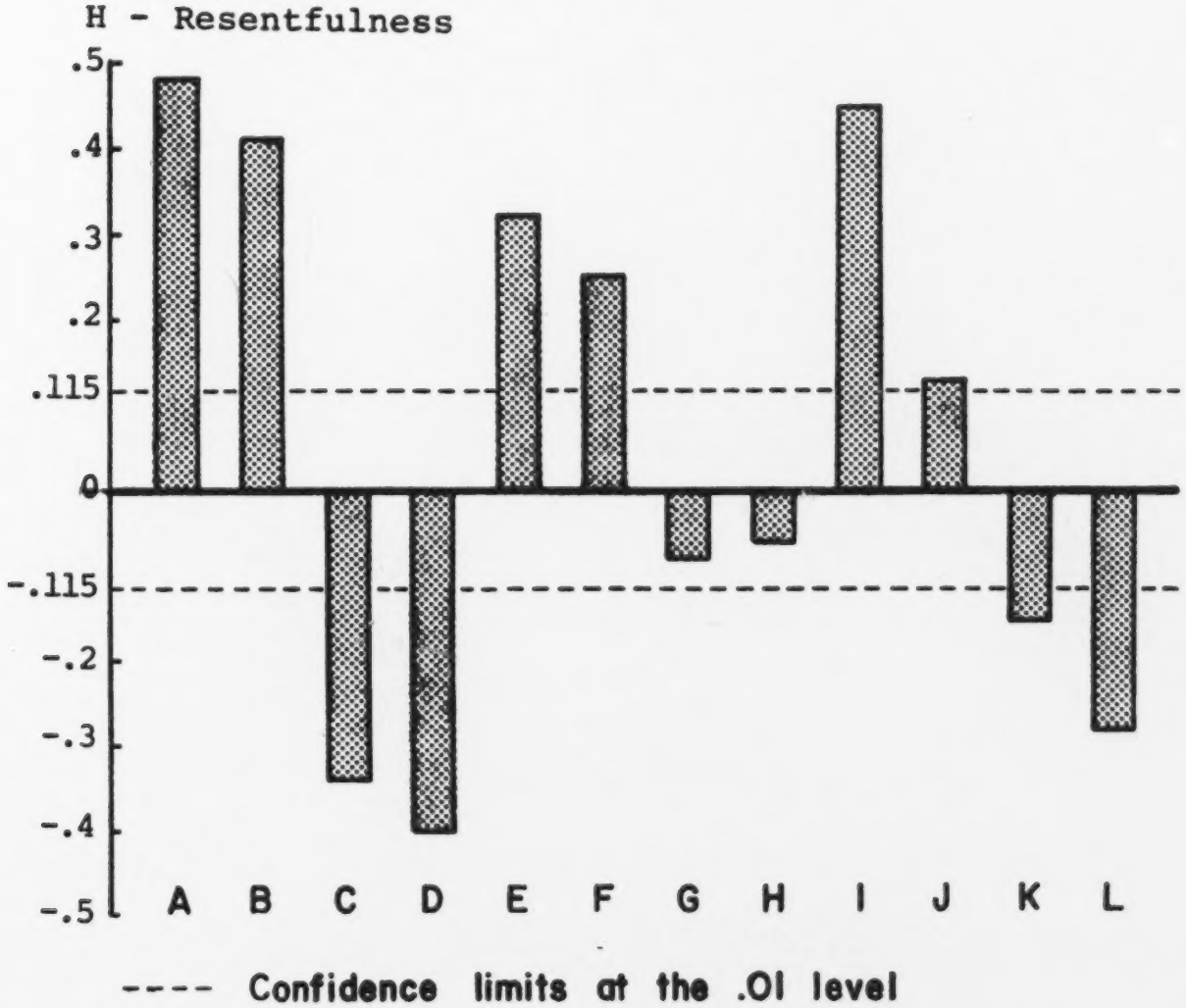
TASK ORIENTATION

I - Perseverance

J - Concentration

K - Hyperactivity

L - Distractability



and Math (both tests of conceptual development).

The correlations of these test with each other at the pre-test and post-test administration, and with the Preschool Inventory at the time of the pre-test, are as follows:

	DRAW-A-MAN		TOBE LANGUAGE		TOBE MATH		PRESCHOOL INVENTORY
	Pre	Post	Pre	Post	Pre	Post	Pre
Peabody Vocabulary	.45	.25	.63	.61	.67	.62	.68
Draw-A-Man			.53	.33	.49	.28	.54
TOBE Language					.73	.74	.68
TOBE Math							.73

Notice that in each case, except TOBE Language and Math, correlations became lower at the time of the post-test than they had been at the time of the pre-test. In a few cases -- specifically where the Draw-A-Man is involved -- the correlations fell quite substantially (from .40s and .50s down to .20s and .30s).

This same general tendency was true in the correlations between the behavior traits and these measures. Inspection of Tables XI through XIV makes clear these general tendencies:

1. A significant relationship between all of the measures and all of the behavior traits, excepting the two negative traits associated with Social Behavior (irritability and resentfulness). The positive traits are positively related, and the negative traits are negatively related.
2. Again, the four traits constituting the Introversion-Extroversion factor are the ones consistently highly related to performance.

TABLE XI

CORRELATIONS BETWEEN EACH OF THE BEHAVIOR TRAITS (GROUPED BY FACTORS) AND THE PEABODY PICTURE VOCABULARY TEST SCORE

INTRO-EXTROVERSION

A - Verbal Expressiveness

B - Gregariousness

C - Social Withdrawal

D - Self-Consciousness

SOCIAL BEHAVIOR

E - Kindness

F - Considerateness

G - Irritability

H - Resentfulness

TASK ORIENTATION

I - Perseverance

J - Concentration

K - Hyperactivity

L - Distractability

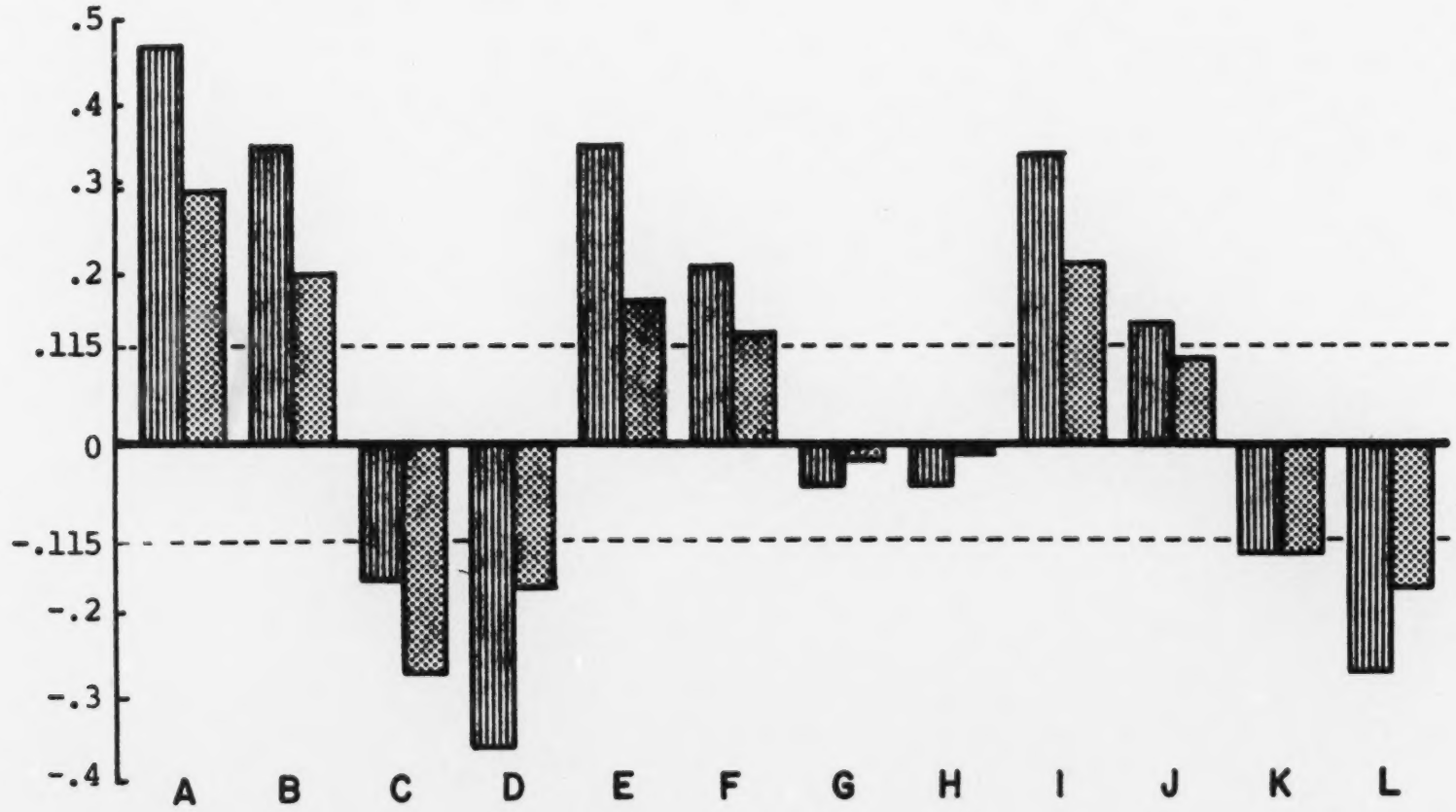


TABLE XII

CORRELATIONS BETWEEN EACH OF THE
BEHAVIOR TRAITS (GROUPED BY FACTORS) AND DRAW-A-MAN SCORE

INTRO-EXTROVERSION

A - Veral Expressiveness

B - Gregariousness

C - Social Withdrawal

D - Self-Consciousness

SOCIAL BEHAVIOR

E - Kindness

F - Considerateness

G - Irritability

H - Resentfulness

TASK ORIENTATION

I - Perseverance

J - Concentration

K - Hyperactivity

L - Distractability

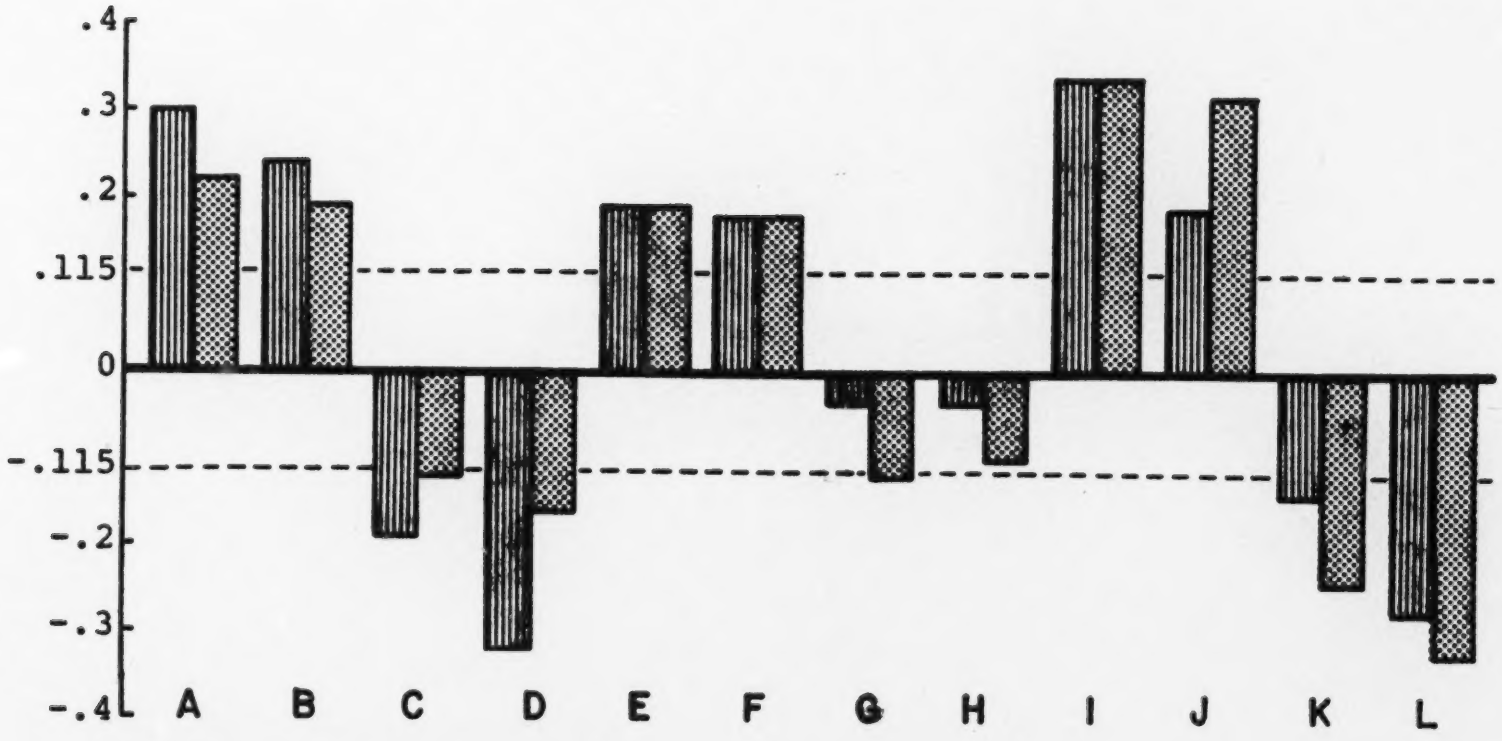


TABLE XIII

CORRELATIONS BETWEEN EACH OF THE
BEHAVIOR TRAITS (GROUPED BY FACTORS) AND THE TOBE LANGUAGE SCORE

INTRO-EXTROVERSION

- A - Verbal Expressiveness
- B - Gregariousness
- C - Social Withdrawal
- D - Self-Consciousness

SOCIAL BEHAVIOR

- E - Kindness
- F - Considerateness
- G - Irritability
- H - Resentfulness

TASK ORIENTATION

- I - Perseverance
- J - Concentration
- K - Hyperactivity
- L - Distractability

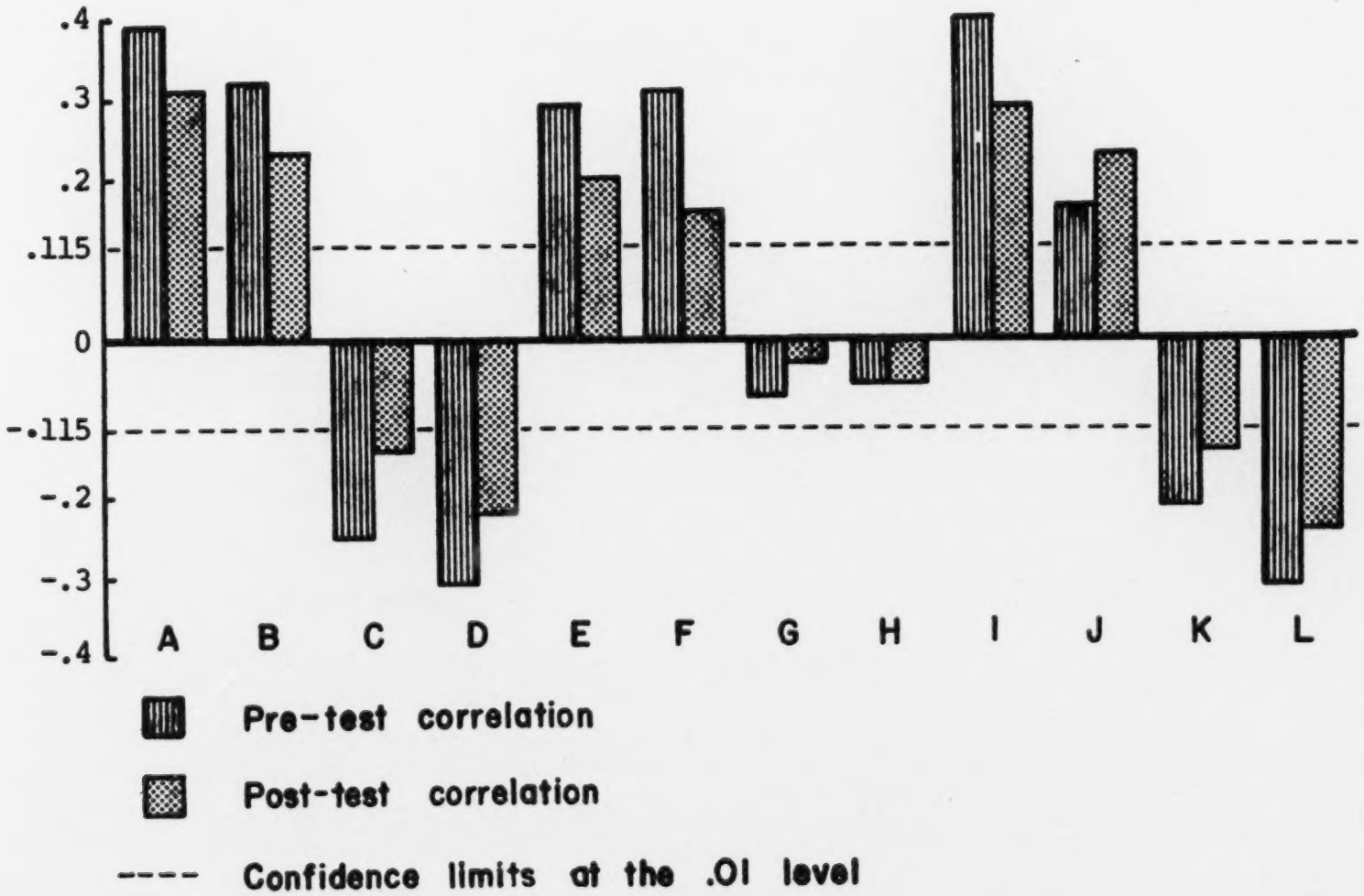


TABLE XIV

CORRELATIONS BETWEEN EACH OF THE
BEHAVIOR TRAITS (GROUPED BY FACTORS) AND THE TOBE MATH SCORE

INTRO-EXTROVERSION

A - Verbal Expressiveness

B - Gregariousness

C - Social Withdrawal

D - Self-Consciousness

SOCIAL BEHAVIOR

E - Kindness

F - Considerateness

G - Irritability

H - Resentfulness

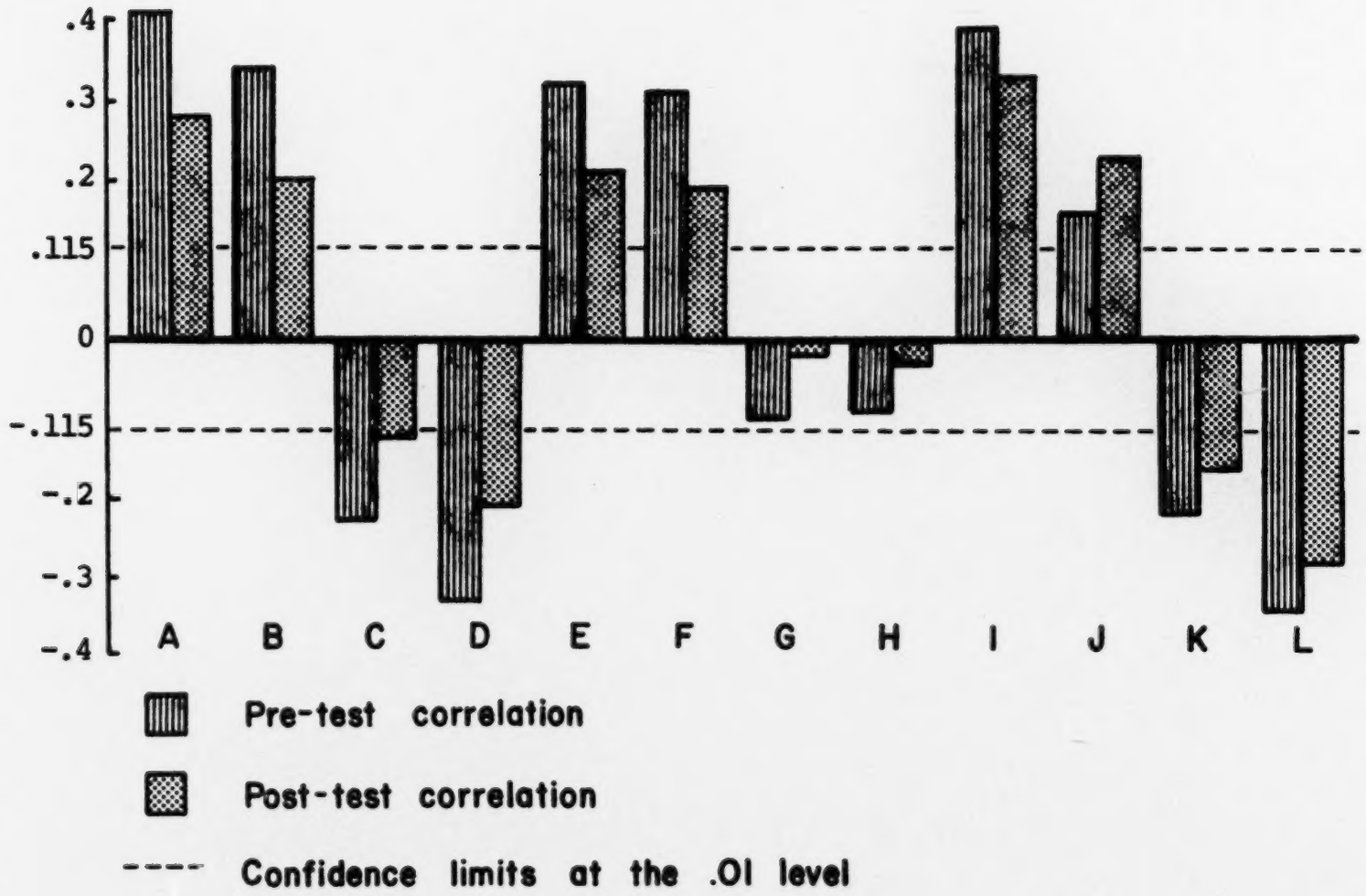
TASK ORIENTATION

I - Perseverance

J - Concentration

K - Hyperactivity

L - Distractability



3. By the end of the kindergarten year, most of the correlations are lower rather than the same as, or stronger than they were at the pre-test. Their magnitude is still great enough to be significant, however.
4. The one trait which is consistently different from the others in this regard is concentration. Its relationship to performance on other measures becomes stronger by the end of the year. However, the magnitude of this correlation by post-test time is actually about the same as the other positive traits, since at pre-test time its correlations had been consistently lower.

Conclusions

Statements on some points of general importance to preschool and early childhood program evaluation can be made as a result of the data and analyses presented in this section.

1. The steadiness of the trends from the beginning to the end of the year, and from one year to the next, gives confidence that the Classroom Behavior Inventory is a means for measuring non-cognitive aspects of children's school experiences. The correlation with other measures in logically acceptable ways also supports this conclusion. The identification of this Inventory as a way of measuring the status and

progress of children in the areas of affect, motivation and behavior appears to be a reasonable breakthrough in measurement. Reports of early childhood projects have repeatedly lamented the lack of instrumentation for this important part of the job of evaluating effectiveness of programs whose goals are broad in range.

2. While no causation is to be inferred from the correlations presented here, it seems reasonable to make the assumption that helping increase children's behavior in the areas of the positive behavior traits -- and decrease the negative -- will have a positive effect upon cognitive performances as well as other aspects of children's adjustment.

3. Positive changes in the behavioral area have been shown to occur in the children enrolled in the North Carolina Early Childhood Centers. Six-year-old children during their second year in the centers, as well as five-year-olds, have demonstrated a pattern of improvement of scores.

TEACHER RATING OF CHILD BEHAVIOR

MODIFIED FROM
CLASSROOM BEHAVIOR INVENTORY

developed by

Earl S. Schaefer
May Aaronson

National Institute of Mental Health

NAME OF STUDENT_____ DATE_____

SCHOOL_____ TEACHER_____

RATER_____ CIRCLE: TEACHER OR TEACHING ASSISTANT

or other_____

INSTRUCTIONS

Please describe as accurately as possible how the above student behaves by circling one of the four responses to each question:

4 - Very frequently present (more than once every day)
3 - Frequently present (about once a day--some days more often)
2 - Sometimes (once a week or a little more often)
1 - Very infrequently (almost never as much as once a week, or never any of this)

Please give a response to every item and BASE YOUR RESPONSE UPON YOUR PERSONAL OBSERVATION with the pupil. Please do not confer with anyone else about the student before completing this form.

	VERY Freq.	Freq.	Some-times	Very Infreq.
1. Talks readily about his toys, clothes, what he is doing, etc.	4	3	2	1
2. Moves from one area of the room to another frequently.	4	3	2	1
3. Takes up for and tries to protect one whom others pick on.	4	3	2	1
4. Plays alone unless he's induced to play with others.	4	3	2	1

	VERY Freq.	Freq.	Some-times	Very Infreq.
5. Works several minutes to finish a task he has begun: painting, solving a puzzle, etc.	4	3	2	1
6. Gets annoyed for trivial reasons.	4	3	2	1
7. Does not wait for others to approach him, but makes the first friendly move.	4	3	2	1
8. Does not finish a project or game because he has lost interest.	4	3	2	1
9. Does not take toys or equipment another child is using.	4	3	2	1
10. Has a low or unsteady voice when speaking before a group. (Group = three or more persons)	4	3	2	1
11. Centers his attention on task he is doing; and if distracted returns to task.	4	3	2	1
12. Sits and sulks if he has been reproved.	4	3	2	1
13. Begins a conversation with another child.	4	3	2	1
14. Twists, turns, or gets up from his chair.	4	3	2	1
15. Brings materials, toys, a cup of water, etc. to another.	4	3	2	1
16. Fails to join in activities with others of his own accord.	4	3	2	1
17. If one effort to do a job is unsuccessful, tries again.	4	3	2	1

	Very Freq.	Freq.	Some-times	Very Infreq.
18. Whines and complains if others won't give him his way.	4	3	2	1
19. Makes an attempt to get others to play with him, join in an activity with him, etc.	4	3	2	1
20. Does not complete a task or errand because other things have captured his attention.	4	3	2	1
21. Is careful not to disturb an activity of another.	4	3	2	1
22. Avoids looking an adult in the face - turns his head or looks down when an adult talks to him.	4	3	2	1
23. Remains quietly at work, even with noises and other activities around him.	4	3	2	1
24. Remains angry for some minutes after a quarrel.	4	3	2	1
25. Has something to say in group discussions.	4	3	2	1
26. Fails to sit still and listen to a story for very long.	4	3	2	1
27. Readily forgives those who have picked on him, taken his belong-ings, etc.	4	3	2	1
28. Works alone, leaves an activity if other children join him.	4	3	2	1
29. Is reluctant to leave a project he has begun.	4	3	2	1
30. Is inclined to flare up if he's teased or picked on.	4	3	2	1

	Very Freq.	Freq.	Some-times	Very Infreq.
31. Joins a group of his own accord (during games, free time, etc.)	4	3	2	1
32. An outside activity or noise distracts his attention from what the teacher is saying to him or to the group he is in.	4	3	2	1
33. Awaits his turn willingly.	4	3	2	1
34. Becomes less effective and skillful in his work when being observed.	4	3	2	1
35. Becomes so absorbed in what he is doing, he may not hear you talk to him.	4	3	2	1
36. Sulks and won't participate in activities when not given his own way.	4	3	2	1
37. Talks about the things that happen to him.	4	3	2	1
38. Squirms, taps his foot or fingers, or is constantly changing his position while attempting to perform a task.	4	3	2	1
39. Smiles at or greets a child.	4	3	2	1
40. Engages in a solitary individual activity.	4	3	2	1
41. Sticks to a task until it is finished.	4	3	2	1
42. Gets in a temper if he can't have his way.	4	3	2	1
43. Approaches others and invites them to play or work with him.	4	3	2	1
44. Centers attention only briefly on what he is doing, then starts something else.	4	3	2	1

	Very Freq.	Freq.	Some-times	Very Infreq.
45. Lets others go first, holds doors open, tries not to block their way.	4	3	2	1
46. Speaks to the teacher in low uncertain tones with much effort.	4	3	2	1
47. Gives close attention to a toy or activity that catches his interest.	4	3	2	1
48. Angry when required to wait his turn or share with others.	4	3	2	1
49. Is quick to make a comment or ask a question about activities going on in the classroom.	4	3	2	1
50. Runs about aimlessly.	4	3	2	1
51. Speaks soothingly, pats or otherwise comforts a child who is hurt or unhappy.	4	3	2	1
52. Goes off by himself when others are gathering to sing, dance or play together.	4	3	2	1
53. Will work with a form board, puzzle or other "achievement" toys for a long period of time, trying to complete it or get it right.	4	3	2	1
54. Gets impatient and unpleasant if he can't get what he wants when he wants it.	4	3	2	1
55. Mixes freely with a group.	4	3	2	1
56. Easily distracted from his own work by the various activities of others.	4	3	2	1

- 6 -

	Very Freq.	Freq.	Some-times	Very Infreq.
57. Is quick to say "thank you", or show his appreciation.	4	3	2	1
58. Shows less strain and is more relaxed if others try not to notice him.	4	3	2	1
59. Quickly becomes lost in his work and is aware of other happenings in the classroom.	4	3	2	1
60. Slow to forgive when offended.	4	3	2	1

SCORING SHEET FOR TEACHER RATING OF CHILD BEHAVIOR

(Child's Name) _____ (School) _____ (Date) _____

(I.D. Number) _____ (Person or Persons who make ratings) _____

(Transfer circled numbers from CBI items to appropriate boxes)

						TOTAL SCORE
1. Verbal Expressiveness	1	13	25	37	49	1
2. Hyperactivity	2	14	26	38	50	2
3. Kindness	3	15	27	39	51	3
4. Social Withdrawal	4	16	28	40	52	4
5. Perseverance	5	17	29	41	53	5
6. Irritability	6	18	30	42	54	6
7. Gregariousness	7	19	31	43	55	7
8. Distractibility	8	20	32	44	56	8
9. Considerateness	9	21	33	45	57	9
10. Self-consciousness	10	22	34	46	58	10
11. Concentration	11	23	35	47	59	11
12. Resentfulness	12	24	36	48	60	12

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DIRECTIONS FOR COMPLETING THE SCORING SHEET OF THE TEACHER RATINGS OF CHILD BEHAVIOR

1. Fill in the child's name, date, school and rater(s).
2. Note that the item scores are places vertically in numerical order. Each number corresponds to the same number on the Teacher Rating of Child Behavior (pink form).
3. This sheet is for entering, in one place, the ratings given for each child on the sixty item Teacher Rating of Child Behavior. Take the pink form for one child and enter the number circled by the rater for that item. The small numbers under "Item Scores" indicate where you are to enter the rating on each item.
4. Carefully copy ratings onto the scoring sheet.
5. Compute the total score for each row on the far right hand side of the sheet.
6. That's all!

THANKS

LINC

1970

CLASSROOM BEHAVIOR INVENTORY
(FORM FOR PRE-SCHOOL TO EARLY PRIMARY)

Early S. Schaefer
May Aaronson
Laboratory of Psychology
National Institute of Mental Health

1. VERBAL EXPRESSIVENESS

1. Will readily talk with you about this toys, clothes, what he is doing, etc.
13. Begins a conversation with another child who moves near him.
25. Always has something to say in group discussions.
37. Likes to talk about everything that happens to him.
49. Is among the first to make a comment or ask a question about class activities.

2. HYPERACTIVITY

2. Moves from one area of the room to another frequently.
14. Frequently is twisting, turning or getting up from his chair.
26. Will not sit still and listen to a story for very long.
38. Squirms, taps his foot or fingers, or is constantly changing his position.
50. Likes to run about aimlessly.

3. KINDNESS (passive helpfulness)

3. Takes up for and tries to protect one whom others pick on.
15. Brings materials, toys, a cup of water, etc. to another.
27. Readily forgives those who have picked on him, taken his belongings, etc.
39. Smiles at or greets any child he meets.
51. Speaks soothingly, pats or otherwise comforts a child who is hurt or unhappy.

4. SOCIAL WITHDRAWAL

4. Plays alone unless he's induced to play with others.
16. Rarely joins in activities with others of his own accord.
28. Prefers working alone, leaves an activity if other children join him.
40. Usually is engaged in a solitary individual activity.
52. Goes off by himself when others are gathering to sing, dance or play together.

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5. PERSEVERANCE (goal directed)

5. Works a long time to finish painting a picture, solving a puzzle, etc.
17. If one effort to do a job is unsuccessful, will try again.
29. Is reluctant to leave a project he has begun.
41. Nearly always sticks to tasks until they are finished.
53. Will work with a form board, puzzle, or other "achievement" toy for a long period of time, trying to get it right.

6. IRRITABILITY

6. Gets annoyed for trivial reasons.
18. Whines and complains if others won't give him his way.
30. Is inclined to flare up if he's teased or picked on.
42. Frequently gets in a temper if he can't get what he wants when he wants it.

7. GREGARIOUSNESS

7. Does not wait for others to approach him, but makes the first friendly move.
19. Seeks others out to get them to play with him, join in an activity with him, etc.
31. Joins a group of his own accord (during games, free time, etc.).
55. Mixes freely with a group and obviously enjoys group companionship.

8. DISTRACTIBILITY

8. Frequently does not finish a project or game because he has lost interest.
20. Often does not complete a task or errand because other things have captured his attention.
32. Any outside activity or noise can distract his attention from what the teacher is saying.
44. Centers attention only briefly on what he is doing, then starts something else.
56. Easily distracted from his own work by the various activities of others.

9. CONSIDERATENESS

9. Will not take toys or equipment another child is using.
21. Is careful not to disturb an activity of another.
33. Awaits his turn willingly.
45. Lets others go first, holds doors open tries not to block their way.
57. Is quick to say "thank you," or show his appreciation.

10. SELF CONSCIOUSNESS

10. Has a low or unsteady voice when speaking before a group.
22. Will not look an adult in the face--will turn his head or look down.
34. Becomes less effective and skillful in his work when being observed.
46. Speaks to the teacher in low, uncertain tones with much effort.
58. Shows less strain and is more relaxed if you try not to notice him.

11. CONCENTRATION

11. Centers his attention on what he is doing; and nothing seems to distract him.
23. Remains quietly at work, even with noises and other activities around him.
35. Becomes so absorbed in what he is doing, he may not hear you talk to him.
47. Gives undivided attention to a toy or activity that catches his interest.
59. Quickly becomes lost in his work and is unaware of other happenings in the classroom.

12. RESENTFULNESS

12. Sits and sulks if he has been reproved.
24. Remains angry a long time after a quarrel.
36. Sulks and won't participate in activities when not given his own way.
48. Angry when required to wait his turn or share with others.
60. Slow to forgive when offended.

HIERARCHIAL STRUCTURE OF THE CLASSROOM BEHAVIOR INVENTORY
(Form for Preschool to Early Primary)

Molar, abstract ——————————→ Concrete, specific

Classroom Adjustment

Dimensions (3 Factors)	Traits (12 Scales)	Specific Behaviors (60 Items)
Extraversion vs. Introversion	Verbal Expressiveness Gregariousness	Always has something to say in group discussions.
	Social Withdrawal Self-Consciousness	Rarely joins in activities with others of his own accord.
Love vs. Hostility	Considerateness Kindness	Is careful not to disturb an activity of another.
	Resentfulness Irritability	Sits and sulks if he has been reproved.
Positive Task-Oriented vs. Negative Task-Oriented	Perseverance Concentration	Nearly always sticks to tasks until they are finished.
	Hyperactivity Distractibility	Frequently is twisting, turning or getting up from his chair.

CHAPTER III

RESULTS OF DATA ANALYSIS FOR FIVE-YEAR OLDS, 1970-71

The results of evaluation of the 1970-71 group of five-year olds provides the opportunity to examine with a much larger group of children some of the conclusions suggested by the 1969-70 study.

Experimental-Control Differences

Many of these conclusions are concerned with the effects of attendance versus non-attendance in kindergarten on children's school-related performances. This calls for comparison of the experimental with the control groups. The 1970-71 study has a particular advantage here, too, because both pre-test and post-test information is available for both groups. The groups could be compared in 1969-70 only for performance at the end of their kindergarten year.

During the 1970-71 evaluation of the North Carolina state kindergarten, a control group of five-year-old children was identified from among the approximately 1,000 students who applied for entrance into the program. These children were tested pre and post by a group of trained personnel from the Learning Institute of North Carolina. These data allow us to draw conclusions concerning differences between the performances of North Carolina state kindergarten enrollees and the diverse control group randomly chosen who may or may not have attended some other kindergarten program in their communities.

We conclude that the experimental group exceeded the control group in absolute scores on every test. Further, gain scores on every measure for the experimental group significantly exceeded that of the control group. This result is true when gain scores are adjusted for influence of socio-economic factors. (Actually, the adjusted scores were changed so little that we conclude that the experimental and control groups were not significantly different on this measure of socio-economic status.)

Table XV presents mean gain scores, standard deviations of gain scores, and t tests for the significance of difference of gain scores between experimental and control groups.

The t values, given on the bottom row of Table XV indicate that the gain of the experimental group over the control group was significant at the indicated level of confidence.

Pre and post scores on these measures together with the amount of gain for the two groups make the picture of this difference more comprehensible. Translating the scores on each, using national norms, is also helpful. The Draw-A-Man and Peabody Vocabulary tests are expressed in terms of mental age, and for the TOBE Language and Math tests in terms of percentile equivalents. This information is presented in Table XVI.

The same information is presented graphically in Table XVII. and shows dramatically how these two groups of children started out close together on all measures, and at points well below national averages on all. At the time of post-testing -- and this is only a few months before the children are about to embark upon

TABLE XV

NORTH CAROLINA FIVE-YEAR OLDS, 1970-71

Comparison of Gains of Experimental With Control Group on Four Measures, With Means Adjusted for Effects of Home Environment, And Including t Values

Groups		MEASURES							
		Draw-A-Man[1]		TOBE Language[2]		TOBE Math[2]		Peabody Picture[3]	
	N	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Experimental	626	5.75	4.9	6.16	4.0	5.12	3.8	9.48	9.8
Control	154	2.63	4.2	3.32	4.6	3.65	4.2	6.72	12.5
t (all significant at .001)		7.334		7.905		4.325		3.049	

[1]Children's drawings were scored by the system described by Julia Vane in "The Vane Kindergarten Test," Journal of Clincial Psychology, Monograph Series 2, 1968.

[2]The TOBE Tests are two of the California Tests of Basic Experiences, published by CTB/McGraw Hill, Del Monte Research Park, Monterey, California. Level K was used with the five-year olds in this study.

[3]The Peabody Picture Vocabulary Test, developed by Lloyd M. Dunn, was published in 1965 by American Guidance Series, Circle Pines, Minnesota. Form A was used for the pre-testing, Form B for post-testing.

TABLE XVI

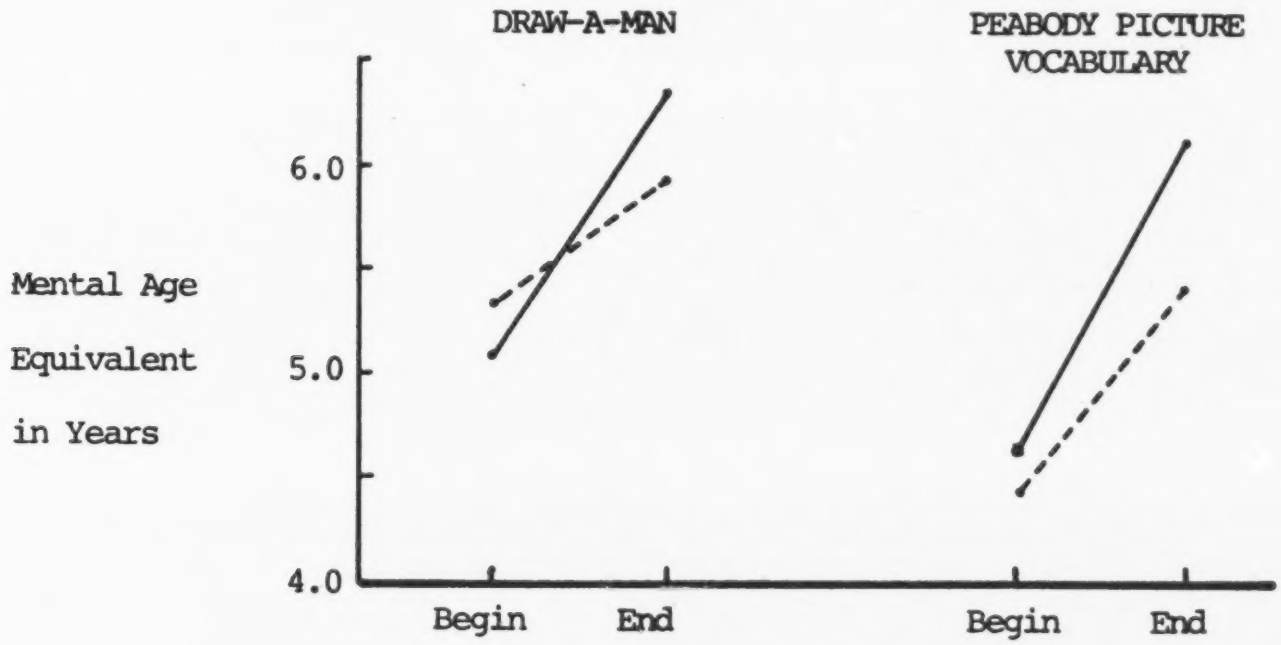
NORTH CAROLINA FIVE-YEAR OLDS, 1970-71

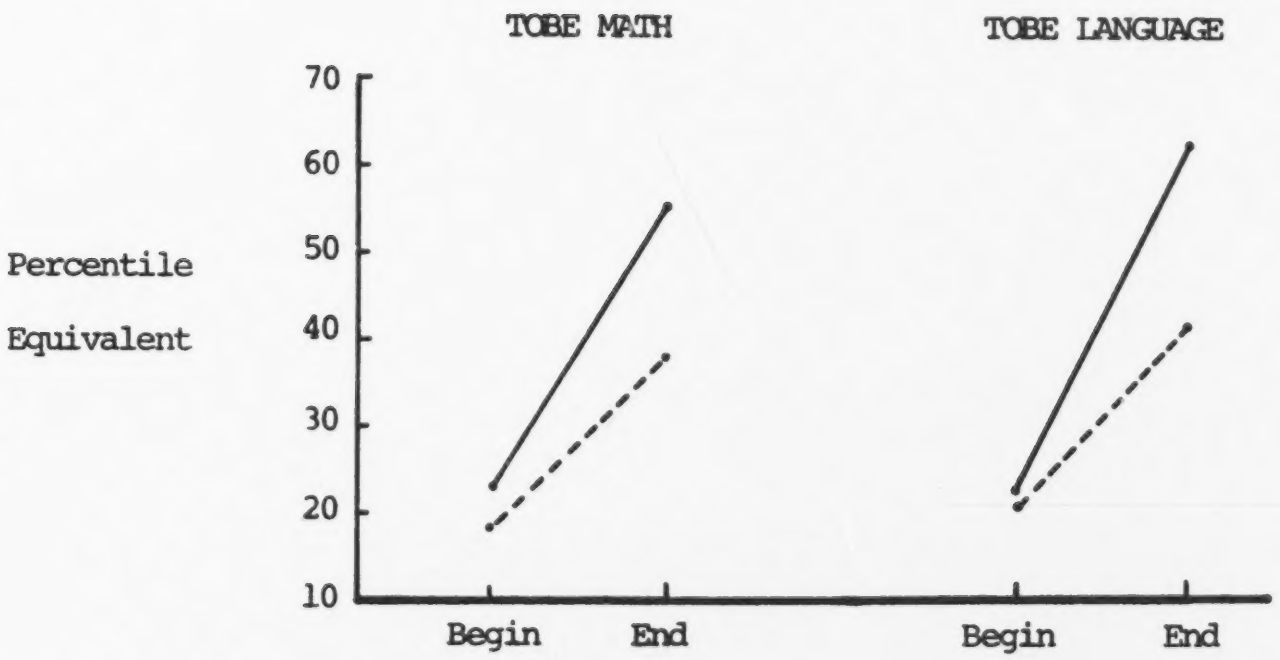
Mean Raw Scores and Mental Age and Percentile Equivalents of Experimental and Control Groups on Four Measures Used, for Pre-Test (September 1970), Amount of Gain and Post-Test (May 1971) Test Performances

Group	Chronological Age		MEASURES: Draw-A-Man Mean	Draw-A-Man Mean MA Equivalent	Peabody Vocabulary Mean	Peabody Vocabulary Mean MA Equivalent	TOBE Math Mean	TOBE Math Percentile Equivalent	TOBE Language Mean	TOBE Language Percentile Equivalent
EXPERIMENTAL (N=674)	5 yr.-6 mo.	PRE	7.9	5 yr.-1 mo.	55	4 yr.-7 mo.	15.1	24th	14.3	23rd
	8 months	GAIN	5.6	15 months	17	17 months	5.1	32 pts.	6.2	40 pts.
	6 yr.-2 mo.	POST	13.5	6 yr.-4 mo.	72	6 yr.-0 mo.	20.2	56th	20.5	63rd
CONTROL (N=178)	5 yr.-6 mo.	PRE	9.0	5 yr.-4 mo.	53	4 yr.-5 mo.	14.3	20th	14.5	22nd
	8 months	GAIN	2.6	7 months	12	12 months	3.6	20 pts.	3.4	22 pts.
	6 yr.-2 mo.	POST	11.6	5 yr.-11 mo.	65	5 yr.-5 mo.	17.9	40th	17.9	44th

TABLE XVII

NORTH CAROLINA FIVE-YEAR OLDS 1970-71
EXPERIMENTAL AND CONTROL GROUPS COMPARED ON THE
FOUR MEASURES USED, SHOWING PRE- AND POST-TEST SCORES AND
AMOUNT OF GAIN IN MENTAL AGE AND PERCENTILE EQUIVALENTS





first grade entrance -- the kindergarteners had surpassed average points for their age level on all but the Peabody Picture Vocabulary, and on that one their gain of 17 months in mental age had brought them almost up to average. The non-kindergarten attenders had gained over their scores of 8 months before, but not enough on a single measure to come up to national averages.

Comparison of 1970-71 Results with Those for the Previous Year

The fact that a new group of children begins school every year presented us with an opportunity immediately to expand on the experiment of the year before. Thus, we can confirm or refute the earlier conclusions with data from a new -- and much larger -- pair of groups.

Table XVIII presents the comparative performances for both years.

The similarities in performance are all the more striking when we realize two other facts. The 1969-70 children began later than the 1970-71 children: December 1 was the starting date for the former group, versus September 1 for the 1970-71 children. This meant that the 1970-71 group was a little younger and less experienced at the time of the pre-test than had been their predecessors. It also meant that they had three months more of kindergarten attendance. Furthermore, the nature of the kindergartens during the second year had itself undergone some important changes. The staffs of the original eight had had more training, as well as experience. In some of the centers the children who came in as five-year olds were grouped with six-year olds, or

TABLE XV.II

COMPARISON OF EXPERIMENTAL-CONTROL DIFFERENCES FOR 1970-71 WITH 1969-70

Mean Scores for Pre-Tests and Post-Tests for Both Years on Three Measures for Experimental Groups; Post-Tests for Both Years on Three Measures for Control Group

Group	N	Number of Months between Pre- and Post Tests	MEASURES: DRAW-A-MAN			TOBE MATH			TOBE LANGUAGE		
			Pre	Gain	Post	Pre	Gain	Post	Pre	Gain	Post
EXPERIMENTAL											
1969-70	317	5 months	8.3	3.2	11.5	16.8	3.6	20.4	15.3	5.4	20.7
1970-71	674	8 months	7.9	5.6	13.5	15.1	5.1	20.2	14.3	6.2	20.5
CONTROL											
1969-70*	52	-	-	-	10.2	-	-	17.0	-	-	16.1
1970-71	178	8 months	9.0	2.6	11.6	14.3	3.6	17.9	14.5	3.4	17.9

*No pre-test information available for 1969-70 control group; therefore, post-test information only is presented.

with six-, seven- and eight-year olds -- though the majority of five-year olds were grouped with their own age peers.

The other point of major difference had to do with the nature of the control groups. The 1969-70 control groups included only children who were not attending any other preschool. A policy change in this respect was decided upon in the summer of 1970. The 1970-71 control groups included some children who were attending kindergarten in the form of privately run classes, Head Start, etc.

These facts seem to clarify a few points observed as differences between the two years' results:

1. Slightly lower pre-test scores on all three measures for the 1970-71 experimental group (Draw-A-Man, 7.9 versus 8.3; TOBE Language, 14.3 versus 15.3; and TOBE Math, 15.1 versus 16.8).
2. Somewhat higher gain on all measures for the 1970-71 experimental group (Draw-A-Man, 5.6 versus 3.6; TOBE Language, 6.2 versus 5.4; TOBE Math, 5.1 versus 3.6).
3. Slightly higher post-test scores for the 1970-71 control group on all measures (Draw-A-Man, 11.6 versus 10.2; TOBE Language, 17.9 versus 16.1; TOBE Math, 17.9 versus 17.0).

We can investigate similarities between 1969-70 and 1970-71 groups by examining the experimental groups alone. We can compare how the measures correlated with each other in the two different experimental groups. We have available for both years most of these inter-correlations for pre-test with pre-test scores, and

post-test with post-test scores. They are presented in Table XIX.

Although there are some differences in the magnitude of relating 1969 with 1970, many of them are strikingly similar, especially at the time of pre-testing. As an example, notice the correlations between each of the tests and the Home Information Scale: TOBE Language, for the 1969 group, correlated .45, and for 1970, .46; TOBE Math, .48 and .46, respectively; and Draw-A-Man, .35 for both groups. Only with the Preschool Inventory was there a difference: the correlation for 1970 being .49, whereas in 1969 it was .59. The fact that the similarities were not as pronounced at the time of post-testing may be related to some of the differences in programs which characterized the two experimental groups. Notice, for example, how even the two TOBE tests, which correlated .70 and .73 for both years' pre-tests, were .65 and .74 for the post-tests.

Educators continue to be concerned that children of the poor are apt to begin school at a great disadvantage. Furthermore, the disparity at the beginning of school between the poor and the affluent children -- in language usage, in the number of words they know, and in other characteristics -- increases as time goes on.

When it came to differences in home environment, the results of the 1969-70 group were significant in several respects. To study how children from disadvantaged home backgrounds performed, children were grouped by scores on the Home Information Scale, a parent questionnaire which is scored to give a quantitative index of educational stimulation present in the child's home.

TABLE XIX

NORTH CAROLINA FIVE-YEAR OLDS

Comparison of Inter-Correlations on the Different Measures for Both Years: Pre-Tests for 1969 with Pre-Test 1970 and Post-Test 1969 with Post-Test 1970

MEASURE	TOBE Language	TOBE Math	Preschool Inventory	Draw-A-Man
Home Information Scale				
Pre x Pre 1969	.45	.48	.59	.35
Pre x Pre 1970	.46	.46	.49	.35
Post x Post 1969	-	-	-	-
Post x Post 1970	.45	.46	-	.17
Language				
Pre x Pre 1969		.70	.68	.41
Pre x Pre 1970		.73	.67	.52
Post x Post 1969		.65	.49	.47
Post x Post 1970		.74	-	.34
Math				
Pre x Pre 1969			.75	.52
Pre x Pre 1970			.72	.48
Post x Post 1969			.45	.46
Post x Post 1970			-	.29
Preschool Inventory				
Pre 1969				.53
Pre 1970				.53
Post x Post 1969				.40

When scores on the TOBE tests were compared for these different groups, the group scoring lowest on the Home Information Scale had the lowest average score. The average for the TOBE scores was higher for each group scoring higher in the Home Information Scale; that is, the higher the HIS score the higher the TOBE score.

The finding, of course, came from data combined from the eight centers across the state. When we looked at what had happened in individual centers, we found further evidence of great gain by students having low scores on the HIS. The center scoring lowest on TOBE tests at the outset made the greatest gains of all, when pre-tests and post-tests were compared. Another center scoring very low at the beginning on Draw-A-Man ended the year with the highest scores on that measure.

Similar data will allow us to investigate the question. Furthermore, sufficient data are now available on sizeable control groups to look at with pre-test as well as post-test scores for the subgroups. We are able now to estimate, with the gains made by the control children representing "normal gain without kindergarten," the difference kindergarten made at the different levels from poverty to affluence.

The 650-plus experimental children for whom all data was available and the 175 in the control group were both grouped into four almost equally-sized groups by Home Information Scale values. Means for pre-test scores' amount of gain and post-test scores were computed for each TOBE Language and Math and on the Draw-A-Man, in addition to the Peabody Picture Vocabulary test.

Table XX presents the results of this analysis, expressed in raw score terms. A consistent picture is clear from this table. The low Home Information Scale scorers in the experimental group always gain more than the high Home Information Scale scorers, size of gain going down little, but consistently on every test. Excepting the Peabody, the difference is small in size between groups, but the direction of the difference is consistent.

In the control group there is on the Draw-A-Man test practically no difference in amounts of gain for the different socio-economic levels; on the TOBEs, more gain for the higher than the lower socio-economic levels; and only on the Peabody, more gain for the lower end of the poverty-affluence scale.

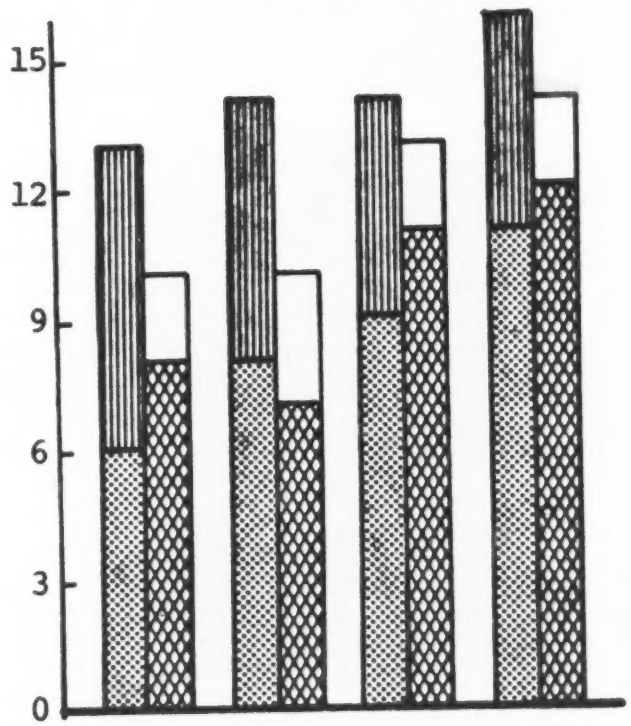
Notice that on the TOBE tests, the magnitude of the gain in the lowest HIS group means that by the end of kindergarten they are doing as well as or better than the highest group's beginning score. For the control group, on the other hand, this group at post-test is still far below the starting point of the upper group, despite its own gain.

The other point to note is that there are gains made by all levels. It's not as though children are all leveled to a similar mediocrity in this program. The upper affluent group gained substantially more than its control, except on the TOBE Math test where they were approximately equal.

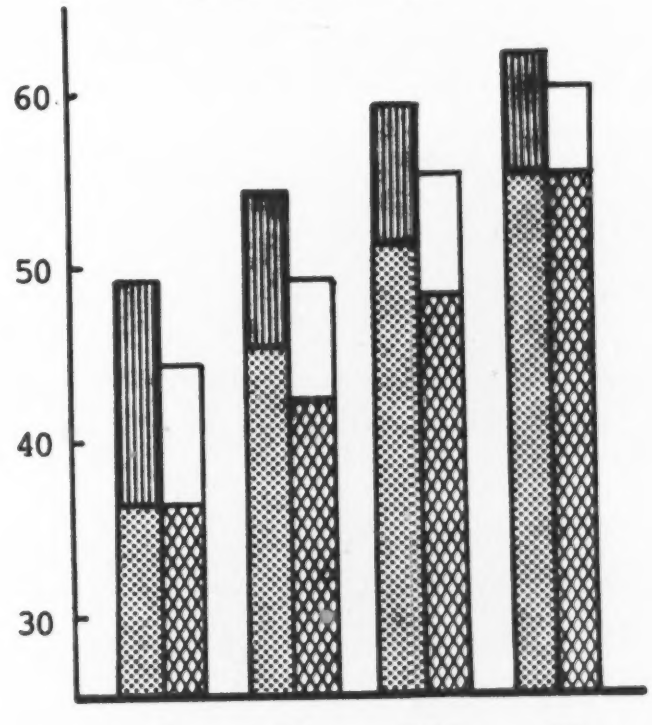
TABLE XX

NORTH CAROLINA FIVE-YEAR OLDS, 1970-71
COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS
PRE-TEST SCORES AND AMOUNT OF GAIN
BY FOUR SOCIO-ECONOMIC GROUPS ON FOUR MEASURES

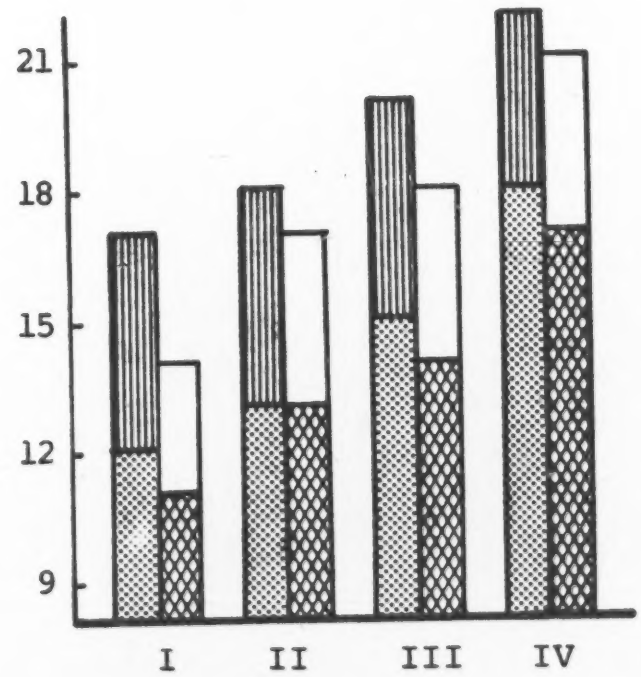
Draw-A-Man Score



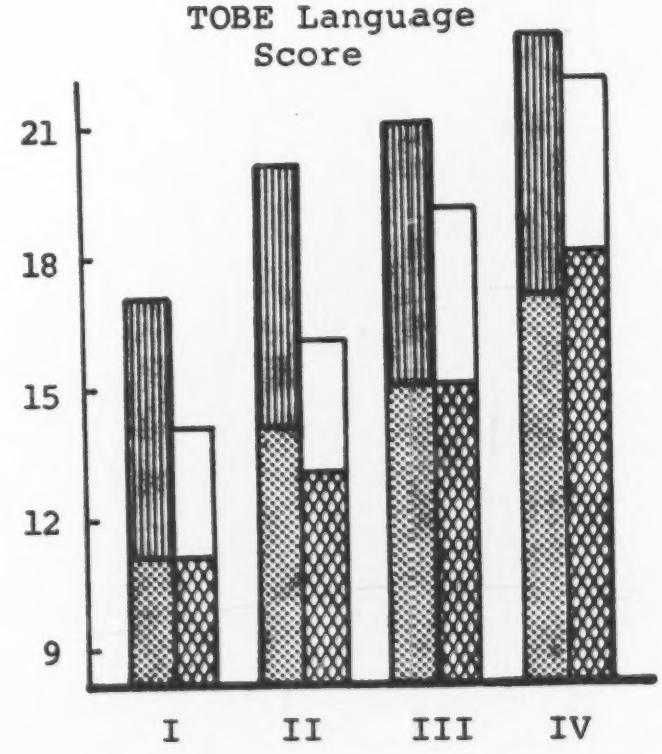
Peabody Score

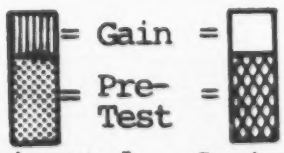


TOBE Math Score



TOBE Language Score





(SOCIO-ECONOMIC GROUPS: I, II, III, IV)

CHAPTER IV

RESULTS OF DATA ANALYSIS FOR SIX-YEAR-OLDS

As a follow up of the first annual evaluation, control and experimental groups for the 1969-70 kindergartens were tested at the close of their first year of public school. During the 1969-70 study, there were approximately 317 experimental children and 79 control children included in the study. By the close of the 1970-71 school year, mobility or inability to give the assessment battery had decreased this number to a significant degree. There remained 157 experimental children and 52 control children usable as subjects in this study. When these smaller populations were studied by race and sex, some of the study groups were so small in size as to be meaningless; e.g., there remain only four (4) girls in the control group.

On all measures, the children who attended kindergarten the year before are maintaining a reasonable average with respect to national norms. Also, they continued to make gains between the beginning and ending of first grade.

Table XXI shows the data for the averages made by all of the experimental group six-year-olds on pre-and post-tests. As these figures show, the mental age equivalents on the Peabody Vocabulary tests rose from 6 years 3 months at the beginning of first grade to 7 years 1 month at the end. This indicates a rise of 10 months over the 8 months of first grade attendance.

The averages made by these children in teacher ratings of behavior also are given in Table XXI for four of the traits most

TABLE XXI

SIX-YEAR OLDS/EXPERIMENTAL GROUPS

Pre and Post Test Scores and Equivalents
and Teacher Ratings of Child Behavior
(N=296)

	PRE-TEST			POST-TEST		
	Mean	Equivalents Mental Age / Percentile		Mean	Equivalents Mental Age/Percentile	
Peabody Vocabulary	57.0	6 yr.- 3 mo.		61.0	7 yr.- 1 mo.	
Draw-A-Man	12.9	6 yr.- 2 mo.		16.0	6 yr.- 11 mo.	
TOBE Language (Advanced Level)	18.5		45th	22.0		70th
TOBE Math (Advanced Level)	17.2		43rd	21.0		70th
Teacher Ratings:						
Verbal Expressiveness	13.5			15.1		
Kindness	11.8			13.2		
Persistence	12.3			13.1		
Concentration	11.5			12.5		

important to school membership and success: verbal expressiveness, kindness, persistence and concentration. As the table shows, all of these increased over the year in school.

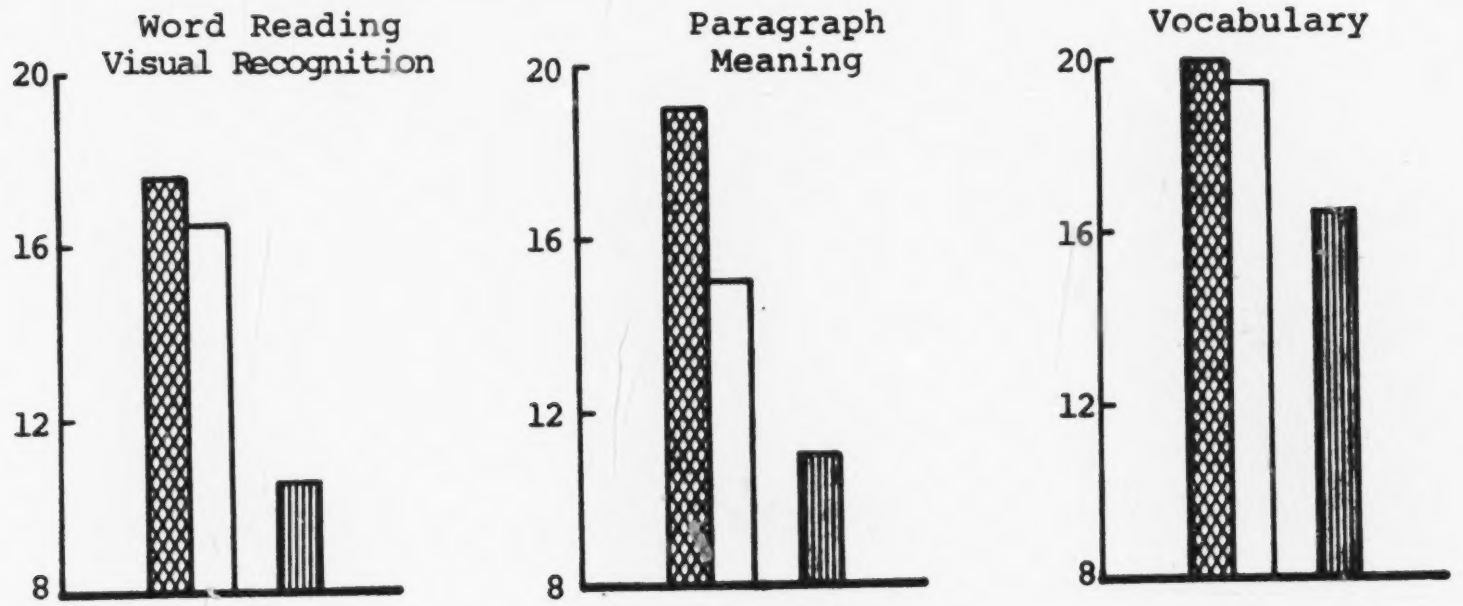
Tables XXII and XXIII give the results on achievement tests at the end of the first grade year. These are presented for white children only in Table XXII and each sub-test is presented on a graph separately. Here, the small number of control group children for that year are presented separately, and boys and girls in the experimental group are also presented separately. Although white girls are ahead of white boys on all sub-tests, notice how much better the boys who had been in kindergarten perform than the boys who had not attended.

The same information for black children is presented in Table XXIII. Notice how the same pattern is present: here the big difference made by kindergarten is with boys.

Further analysis by individual centers and for the different kinds of classrooms (multi-ageing, for example) will be reported in additional reports from LINC.

TABLE XXII

NORTH CAROLINA SIX-YEAR OLDS, 1970-71
PERFORMANCE OF WHITE CHILDREN
ON STANFORD ACHIEVEMENT TESTS, SPRING 1971

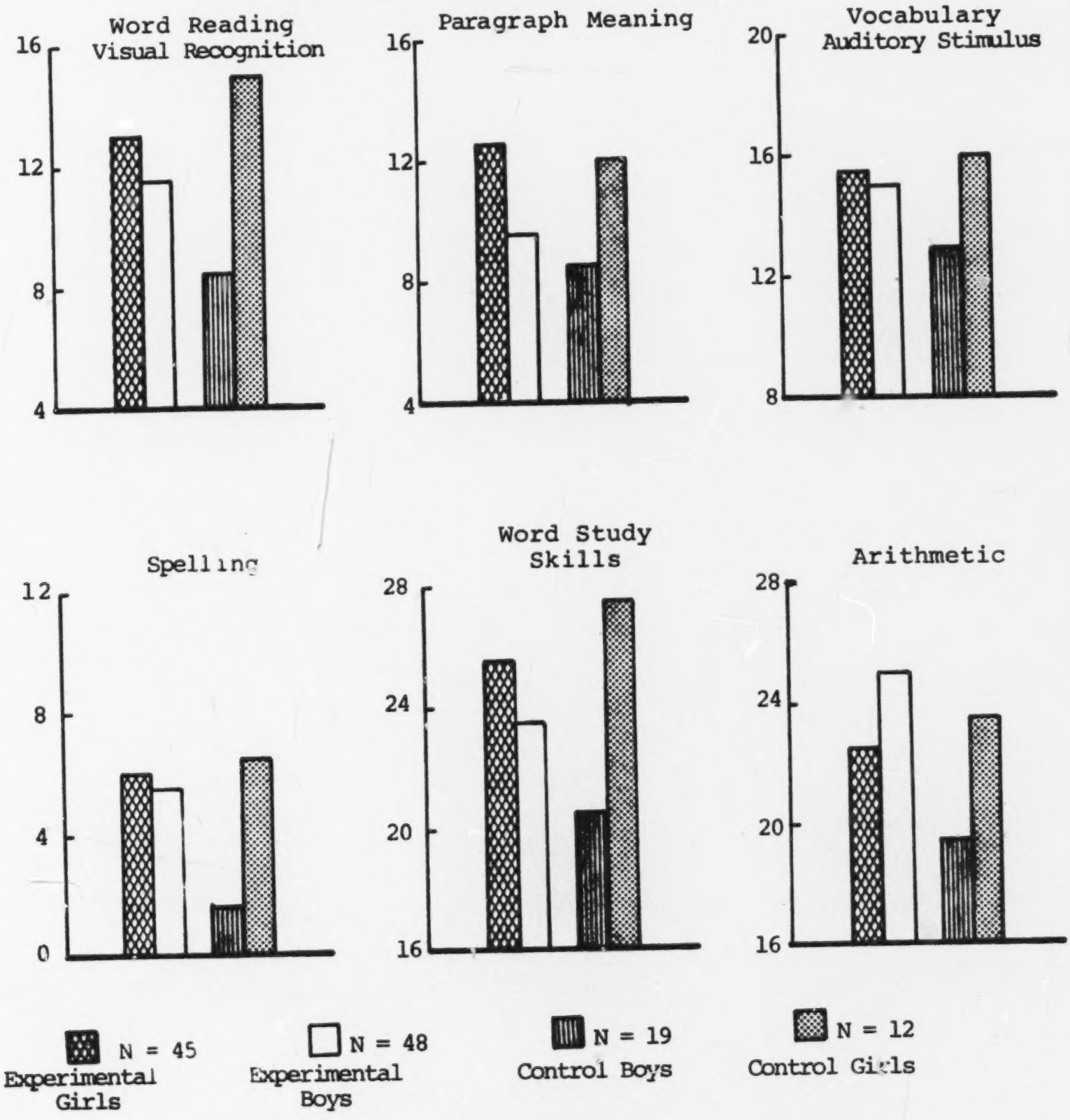


(Note: Control Girls Number only 4 - not sufficient to include as a group.)

MEANS FOR EXPERIMENTAL BOYS COMPARED WITH MEANS FOR
EXPERIMENTAL GIRLS AND CONTROL GROUP BOYS

TABLE XXIII

NORTH CAROLINA SIX-YEAR OLDS
PERFORMANCE OF BLACK CHILDREN
ON STANFORD ACHIEVEMENT TESTS, SPRING 1971



MEANS FOR EXPERIMENTAL BOYS COMPARED WITH MEANS FOR
EXPERIMENTAL GIRLS AND CONTROL GROUP BOYS AND GIRLS

CHAPTER V

SUMMARY AND CONCLUSIONS

The Research and Evaluation Team of the Learning Institute of North Carolina evaluated the second year of the state supported Early Childhood Education Program, using a pre-post evaluation design involving experimental and control groups. The North Carolina Early Childhood Assessment Battery was administered to 720 five-year-olds enrolled in the kindergarten program by their teachers. The control group (about 178), those not selected from among the applicants by stratified random sampling, were tested by LINC personnel in their local areas.

Results from the analysis of these data indicate the following:

A. For Non-Cognitive Areas

1. The steadiness of the trends from the beginning to the end of the year, and from one year to the next, gives confidence that the Classroom Behavior Inventory is a means for measuring non-cognitive aspects of children's school experiences. The correlation with other measures in logically acceptable ways also supports this conclusion. The identification of this Inventory as a way of measuring the status and progress of children in the areas of affect, motivation and behavior appears to be a major breakthrough. Reports of early childhood projects have repeatedly lamented the lack of instrumentation for this important part of the job of evaluating effectiveness of

programs whose goals are broad in range.

2. While no causation is to be inferred from the correlations presented here, it seems reasonable to make the assumption that helping increase children's behavior in the areas of the positive behavior traits -- and decrease the negative -- will have a positive effect upon cognitive performances as well as other aspects of children's adjustment.

3. Positive changes in the behavioral area have been shown to occur in the children enrolled in the North Carolina Early Childhood centers. Six-year-old children during their second year in the centers, as well as five-year olds, have demonstrated a pattern of improvement of scores.

B. For Cognitive Changes, Experimental vs. Control, Five-Year-Olds

4. The experimental group exceeded the control group in absolute scores on every test.

5. Gain scores on every measure for the experimentals significantly exceeded that of the control group.

6. The non-kindergarten attenders had gained over their scores of eight months before, but not enough on a single measure to come up to national averages.

C. First Graders Who Had Attended Kindergarten in the North Carolina Early Childhood Centers

7. All children who attended kindergarten the year before are maintaining a reasonable average with respect to national norms.

8. The children who had attended kindergarten the year before continued to make substantial gains between the beginning and ending of first grade on all measures: Peabody Picture Vocabulary, Draw-A-Man, TOBE Language and Math, as well as on Teacher Ratings of Child Behavior.

APPENDIX A

ANALYSIS OF COVARIANCE TABLES

FOR 1970-71 NORTH CAROLINA STATE KINDERGARTEN STUDY

STATE KINDERGARTEN PROGRAM 1970-71
COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS USING HOME INFORMATION SCALE AS THE COVARIATE

VARIABLE 1 DRAW A MAN TEST

						DEVIATIONS FROM REGRESSION				
		DF	SX2	SXY	SY2	DF	SY2 - (SXY)2/SX2	MEAN SQUARE	F	B
1	GROUP 1	626.	89712.69	-6244.56	15117.17	625.	14682.51	23.49		-0.07
2	GROUP 4	154.	24817.56	20.82	2672.04	153.	2672.02	17.46		0.00
4	WITHIN					778.	17354.53	22.31		
5	REG. COEF.					1.	96.47	96.47	4.32	
6	COMMON	780.	114530.25	-6223.74	17789.21	779.	17451.00	22.40		-0.05
7	ADJ. MEANS					1.	1205.01	1205.01	53.79	
8	TOTAL	781.	114531.00	-6214.50	18993.21	780.	18656.01			

COUNT INCLUDING STUDENTS WITH MISSING DATA(1)= 674.

COUNT INCLUDING STUDENTS WITH MISSING DATA(4)= 178.

	MEAN COV.	MEAN CRIT.	ADJ. MEAN	S.D.COV	S.D.CRITERION
GROUP 1	37.7	5.745	5.745	11.97	4.91
GROUP 4	37.7	2.632	2.631	12.69	4.17

T(1, 4)= 7.334

STATE KINDERGARTEN PROGRAM 1970-71
COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS USING HOME INFORMATION SCALE AS THE COVARIATE

VARIABLE 2 TOBE LANGUAGE SCALE

					DEVIATIONS FROM REGRESSION				
	DF	SX2	SXY	SY2	DF	SY2 - (SXY)2/SX2	MEAN SQUARE	F	B
1 GROUP 1	641.	91061.88	-1332.00	10206.43	640.	10186.94	15.92		-0.01
2 GROUP 4	164.	27111.88	782.71	3405.61	163.	3383.02	20.75		0.03
4 WITHIN					803.	13569.96	16.90		
5 REG. COEF.					1.	39.52	39.52	2.34	
6 COMMON	805.	118173.75	-549.29	13612.04	804.	13609.48	16.93		-0.00
7 ADJ. MEANS					1.	1057.68	1057.68	62.48	
8 TOTAL	806.	118194.00	-693.19	14671.23	805.	14667.16			

COUNT INCLUDING STUDENTS WITH MISSING DATA(1)= 674.

COUNT INCLUDING STUDENTS WITH MISSING DATA(4)= 178.

	MEAN COV.	MEAN CRIT.	ADJ. MEAN	S.D.COV	S.D.CRITERION
GROUP 1	37.9	6.156	6.155	11.92	3.99
GROUP 4	38.2	3.315	3.317	12.86	4.56

T(1, 4)= 7.905

STATE KINDERGARTEN PROGRAM 1970-71
COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS USING HOME INFORMATION SCALE AS THE COVARIATE

VARIABLE 3 TOBE MATHEMATICS SCALE

					DEVIATIONS FROM REGRESSION				
	DF	SX2	SXY	SY2	DF	SY2 - (SXY)2/SX2	MEAN SQUARE	F	B
1 GROUP 1	625.	91711.69	-1663.38	8891.25	624.	8861.08	14.20		-0.02
2 GROUP 4	164.	26607.25	447.36	2949.61	163.	2942.09	18.05		0.02
4 WITHIN					787.	11803.17	15.00		
5 REG. COEF.					1.	25.19	25.19	1.68	
6 COMMON	789.	118318.94	-1216.02	11840.86	788.	11828.36	15.01		-0.01
7 ADJ. MEANS					1.	280.73	280.73	18.70	
8 TOTAL	790.	118334.00	-1279.88	12122.93	789.	12109.09			

COUNT INCLUDING STUDENTS WITH MISSING DATA(1)= 674.

COUNT INCLUDING STUDENTS WITH MISSING DATA(4)= 178.

	MEAN COV.	MEAN CRIT.	ADJ. MEAN	S.D.COV	S.D.CRITERION
GROUP 1	37.9	5.118	5.117	12.11	3.77
GROUP 4	38.2	3.648	3.651	12.74	4.24

T(1, 4)= 4.325

STATE KINDERGARTEN PROGRAM 1970-71
COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS USING HOME INFORMATION SCALE AS THE COVARIATE

VARIABLE 4 PEABODY SCALE

	DF	SX2	SXY	SY2	DEVIATIONS FROM REGRESSION DF	SY2 - (SXY)2/SX2	MEAN SQUARE	F	B
1 GROUP 1	631.	91752.94	-13488.63	60443.81	630.	58460.84	92.79		-0.15
2 GROUP 4	161.	27578.00	-1724.01	24992.57	160.	24884.79	155.53		-0.06
4 WITHIN					790.	83345.63	105.50		
5 REG. COEF.					1.	151.38	151.38	1.43	
6 COMMON	792.	119330.94	-15212.64	85436.38	791.	83497.00	105.56		-0.13
7 ADJ. MEANS					1.	981.25	981.25	9.30	
8 TOTAL	793.	119340.00	-15304.50	86441.00	792.	84478.25			

COUNT INCLUDING STUDENTS WITH MISSING DATA(1)= 674.

COUNT INCLUDING STUDENTS WITH MISSING DATA(4)= 178.

	MEAN COV.	MEAN CRIT.	ADJ. MEAN	S.D.COV	S.D.CRITERION
GROUP 1	37.7	9.483	9.476	12.06	9.79
GROUP 4	37.9	6.691	6.717	13.09	12.46

T(1, 4)= 3.049

IHC900I EXECUTION TERMINATING DUE TO ERROR COUNT FOR ERROR NUMBER 217

APPENDIX B

STEPWISE MULTIPLE REGRESSION

GROUP 1 = 674 STATE KINDERGARTEN PROGRAM 1970-71 CORRELATION MATRICES

MULTIPLE REGRESSION ANALYSIS - STEPWISE - N = 647. CORRELATIONS, MEANS, STANDARD DEVIATIONS

	LANG1	MATH1	PPV1	PSI	DAY1	MEANS, STANDARD DEVIATION	
HIS	4605	4638	5314	4385	3464	37.96290571	12.02494245
LANG1		7251	6307	6691	5221	14.31993817	4.75120529
MATH1			6644	7197	4838	15.03863987	4.85982781
PPV1				6701	4546	46.28129830	12.69887055
PSI					5285	44.13292117	11.95480192
DAY1						7.86553323	4.48963398

GROUP 4 = 178 STATE KINDERGARTEN PROGRAM 1970-71 CORRELATION MATRICES

MULTIPLE REGRESSION ANALYSIS - STEPWISE - N = 174. CORRELATIONS, MEANS, STANDARD DEVIATIONS

	LANG1	MATH1	PPV1	DAM1	MEANS, STANDARD DEVIATION	
HIS	5241	4775	5605	4229	37.82758620	12.86677569
LANG1		7423	6760	5631	14.46551724	4.96536740
MATH1			6855	5046	14.27011494	4.75182021
PPV1				4302	44.93103448	12.51107542
DAM1					8.87931034	4.86610639

GROUP 1 = 574 STATE KINDERGARTEN PROGRAM 1970-71 CORRELATION MATRICES

MULTIPLE REGRESSION ANALYSIS - STEPWISE - N = 532. CORRELATIONS, MEANS, STANDARD DEVIATIONS
GAINS BETWEEN PRE AND POST TESTS

	LANG	MATH	PPV	DAM	MEANS, STANDARD DEVIATION	
PIS	-.0543	-.1049	-.2319	-.1618	38.00632911	12.03934768
LANG		.2593	.0329	.1204	6.13291139	3.72442902
MATH			.1820	.0893	5.03955696	3.40131676
PPV				.1795	9.39399734	8.29993385
DAM					5.57436708	4.78952453

GROUP 4 = 178 STATE KINDERGARTEN PROGRAM 1970-71 CORRELATION MATRICES

MULTIPLE REGRESSION ANALYSIS - STEPWISE - N = 171. CORRELATIONS, MEANS, STANDARD DEVIATIONS

	LANG	MATH	PPV	DAM	MEANS, STANDARD DEVIATION	
RIS	1097	0998	-1149	-0400	37.85380117	12.87518527
LANG		2905	0731	1493	3.42105263	3.80532463
MATH			1482	1868	3.83625731	3.50748375
PPV				0583	6.50877193	8.18130467
DAM					2.44444444	3.61225220

ANALYSIS V

GROUP 1 = 674 STATE KINDERGARTEN PROGRAM 1970-71 CORRELATION MATRICES

MULTIPLE REGRESSION ANALYSIS - STEPWISE - N = 636. CORRELATIONS, MEANS, STANDARD DEVIATIONS

	LANG2	MATH2	PPV2	PSI	DAM2	MEANS, STANDARD DEVIATION	
HIS	4455	4577	5199	4901	1699	37.97798742	12.01729115
LANG2		7449	6054	6739	3362	20.50314465	4.39021705
MATH2			6137	6962	2911	20.12578616	4.11372527
PPV2				6326	2521	55.74842767	9.05787501
PSI					3165	44.24685534	11.81779278
DAM2						13.49842767	4.39662936

APPENDIX C

ANALYSIS OF VARIANCE

ANALYSIS OF VARIANCE

The following is an example of the analysis of variance results that have been done. Analysis of Variance results are available on each test in the North Carolina Kindergarten Battery in the LINC Research and Evaluation office. These data would make an unmanageable report and are not included in full.

TOTAL POPULATION = 852

GROUP SIZES AND TRANSFORMED VARIABLES STATE KINDERGARTEN PROGRAM 1970-71 STATISTICAL ANALYSIS OF PRESCHOOL INV

N = 410 GROUP 5 = 0 WITH SEX EQUAL 1.0

N = 442 GROUP 6 = 0 WITH SEX EQUAL 2.0

N = 345 GROUP 7 = 0 WITH RACE EQUAL 1.0

N = 503 GROUP 8 = 0 WITH RACE EQUAL 3.0

N = 674 GROUP 9 = 0 WITH GRP EQUAL 1.0

N = 178 GROUP 10 = 0 WITH GRP EQUAL 4.0

DAM = DAM2 - DAM1

LANG = LANG2 - LANG1

MATH = MATH2 - MATH1

PPV = PPV2 - PPV1

HIS = PART (29.0 1.0 38.0 2.0 47.0 3.0 99.0 4.0)

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TELE-STORAGE AND RETRIEVAL SYSTEM TRIANGLE UNIVERSITIES COMPUTATION CENTER 9/26/71 ANALYSIS I

GROUP 9 = 674 STATE KINDERGARTEN PROGRAM 1970-71 STATISTICAL ANALYSIS OF DRAW-A-MAN TEST

TSAR FORTRAN PROCEDURE TFAOV3 FOR VARIABLE DAM

ANALYSIS OF VARIANCE THREE WAY - LAYER 1

GROUP	7	8
5 N	53	20
AVE	7.2453	5.2500
SD	4.1783	5.4568
6 N	79	21
AVE	6.7975	5.8571
SD	5.3118	5.0129

LAYER 1 N = 173 AVE = 6.6416 SD = 4.9707

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ANALYSIS OF VARIANCE THREE WAY - LAYER 2

GROUP	7	8
5 N	38	41
AVE	6.5263	5.7317
SD	4.0453	4.6692
6 N	32	49
AVE	6.5000	4.2041
SD	3.5921	4.6187

LAYER 2 N = 160 AVE = 5.6063 SD = 4.3842

ANALYSIS OF VARIANCE THREE WAY - LAYER 3

GROUP	7	8
5 N	17	52
AVE	7.2353	4.4423
SD	3.4375	5.1351
6 N	27	57
AVE	4.5926	4.9298
SD	4.3876	4.4194

LAYER 3 N = 153 AVE = 4.9608 SD = 4.6125

ANALYSIS OF VARIANCE THREE WAY - LAYER 4

GROUP	7	8
5 N	6	72
AVE	5.3333	4.0694
SD	3.2042	5.0360
6 N	10	63
AVE	7.0000	5.5873
SD	3.3333	5.2260

LAYER 4 N = 151 AVE = 4.9470 SD = 5.0130

ANALYSIS OF VARIANCE THREE WAY -- ROW TOTALS

ROW	5	N =	299	AVE =	5.5217	SD =	4.7764
ROW	6	N =	338	AVE =	5.6243	SD =	4.8181

ANALYSIS OF VARIANCE THREE WAY -- COLUMN TOTALS

GROUP	7	8
N	262	375
AVE	6.5878	4.8693
SD	4.4237	4.9220

GRAND TOTAL N = 637 AVE = 5.5761 SD = 4.7951

SOURCE	DF	SS	MS
COLUMNS	1	188.49026634	188.49026634
ROWS	1	0.20198397	0.20198397
LAYERS	3	53.05444491	17.68481497
ROW*COL	1	9.72868987	9.72868987
ROW*LAY	3	104.10823223	34.70274408
COL*LAY	3	1.42968853	0.47655618
R*C*L	3	70.12486140	23.37495380
WITHIN	621	13851.75340712	22.30556104

TELE-STORAGE AND RETRIEVAL SYSTEM TRIANGLE UNIVERSITIES COMPUTATION CENTER 9/26/71 ANALYSIS II

GROUP 10 = 178 STATE KINDERGARTEN PROGRAM 1970-71 STATISTICAL ANALYSIS OF DRAW-A-MAN TEST

TSAR FORTRAN PROCEDURE TRADV3 FOR VARIABLE DAM

ANALYSIS OF VARIANCE THREE WAY - LAYER 1

GROUP	7	8
5 N	10	9
AVE	3.2000	3.7778
SD	2.6162	3.8006
6 N	22	6
AVE	1.5455	4.3333
SD	4.1716	3.6111

LAYER 1 N = 47 AVE = 2.1064 SD = 3.7662

ANALYSIS OF VARIANCE THREE WAY - LAYER 2

GROUP	7	8
5 N	11	13
AVE	4.0000	3.1538
SD	3.3764	3.7605
6 N	10	9
AVE	2.9000	2.1111
SD	3.0714	3.3706

LAYER 2 N = 43 AVE = 3.0930 SD = 3.3723

ANALYSIS OF VARIANCE THREE WAY - LAYER 3

GROUP	7	8
5 N	5	18
AVE	2.6000	2.2222
SD	4.2190	3.8126
6 N	5	15
AVE	2.6000	1.6000
SD	4.0988	3.9964

LAYER 3 N = 43 AVE = 2.0930 SD = 3.8286

ANALYSIS OF VARIANCE THREE WAY - LAYER 4

GROUP	7	8
5 N	2	19
AVE	-1.5000	2.3684
SD	0.7071	3.2525
6 N	2	15
AVE	-4.5000	3.3333
SD	6.3640	2.8702

LAYER 4 N = 38 AVE = 2.1842 SD = 3.6157

ANALYSIS OF VARIANCE THREE WAY -- ROW TOTALS

ROW 5 N = 87 AVE = 2.5172 SD = 3.5202
ROW 6 N = 84 AVE = 2.2143 SD = 3.7867

ANALYSIS OF VARIANCE THREE WAY -- COLUMN TOTALS

GROUP	7	8
N	67	104
AVE	2.2836	2.4231
SD	3.8605	3.5189

GRAND TOTAL N = 171 AVE = 2.3684 SD = 3.6459

SOURCE	DF	SS	MS
COLUMNS	1	33.54983830	33.54983830
ROWS	1	3.43921790	3.43921790
LAYERS	3	147.81864188	49.27294729
ROW*COL	1	30.33645046	30.33645046
ROW*LAY	3	17.40444682	5.80148227
COL*LAY	3	198.28978942	66.09659647
R*C*L	3	40.46797114	13.48932371
WITHIN	155	2003.29012800	12.92445244

APPENDIX D

PLOT OF HOME INFORMATION SCALE SCORES (HORIZONTAL)

AND PRESCHOOL INVENTORY SCORES (VERTICAL)

ANALYSIS IV

GROUP 0 = 852 STATE KINDERGARTEN PROGRAM 1970-71 STATISTICAL ANALYSIS OF PRESCHOOL INV

TSAR FORTRAN PROCEDURE TFPLOT FOR VARIABLES HIS , PSI